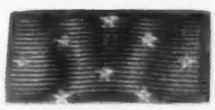
The OIL WEEKLY

"... AT THE RISK OF HIS LIFE, ABOVE AND BEYOND THE CALL OF DUTY"

Congressional Medal of Honor—U. S. Navy

Below: Ribbon which may be worn in lieu of the Medal



. . . Having lost the assistance of his teammates, interposed his plane between his ship and an advancing enemy formation of nine attacking bombers . . . without hesitation, alone and unaided, repeatedly attacked this enemy formation at close range in the face of their intense fire . . . shot down five and severely damaged a sixth. . . .

For such gallant action, this Pilot was cited for the Navy's Medal of Honor. Authorized in 1861, this medal was originally established "to promote the efficiency of the Navy" and was restricted for enlisted men; it was not until 1915 that award of this Medal was made to include Officers of the Navy (all Medals for the Navy now are also authorized for the Marine Corps and Coast Guard).

While a new Medal of Honor was designed for and used by the Navy during the first World War, the original design is being used at the present time; it is awarded in the name of Congress (hence sometimes referred to as the Congressional Medal of Honor) to each person "who, while an officer or enlisted man . . . shall, in action involving actual conflict with an enemy, distinguish himself conspicuously by gallantry and intrepidity at the risk of his life, above and beyond the call of duty."

HUGHES TOOL COMPANY—Houston, Texas

The COSMOPOLITE DRILLER*
Near Old Oran, on Sahara sand,
He "dug" a wildcat hole;
Then at Algiers, in recent years,
He played the driller's role.
With an Indian tribe on the towering side
Of Santa Maria Hill
He pushed the bit in a worthless pit
That's wrecked in Colombia still.
The tropical heat has a blistering beat
For work in Bolivian wastes,
And the white man's toil diggin' Pampa soil
Don't please even drillers' tastes.
By boat from Rio to Rosario
Is the only course for man;
From there they go, on a slow burro,
Up the trail to Tucuman.
'Tis a grand old scene in the Argentine
With jungles and hills galore,
But it's pure dee hell to drill a well
With nature paddin' the score!
*This, our tribute to drillers we've been privileged to serve in remote parts of the world for nearly half a century, was taken from a story in The Oil Weekly of March 30, 1928. Venezuelan scene photographed by Robert Yarnall Richie. Character posed by Hubert Rodriguez of Sulphur, Louisiana.
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LOOKING AHEAD
. . . with the Editor

IN ONE field where a natural-gasoline plant compressed the gas for gas-lift operations, it was found impossible to evaluate the records on the usual 7-day charts and obtain accurate data on gas flow, pressures or operating cycles. By checking a series of normal operating cycles with a fast clock, instead of the usual weekly recording, readily interpreted curves were obtained, and a basis established whereon could be correlated gas-oil ratios from the producing wells, and the proper accounting for gas from different sources quickly and accurately made.

An article, by the gas measurement engineer of the company using it, which will describe the method and be illustrated with normal and specially obtained "fast-clock" charts, will appear in an early number.

The Oil Man's Calendar

APR.	
14-16	**Natural Gasoline Association of America, Twenty-second Annual Meeting, Baker Hotel, Dallas, Texas.**
15-16	**National Petroleum Association, Semi-Annual Meeting, Cleveland Hotel, Cleveland, Ohio.**
28	**Natural Gas Management Conference, Under Auspices of Natural Gas Section, American Gas Association, Gibson Hotel, Cincinnati, Ohio.**
29-30	**American Petroleum Institute, Division of Production, Southwestern District, Rice Hotel, Houston.**
MAY	
5- 6	**Petroleum Electrical Association, Houston.**
6- 8	**American Institute of Mining and Metallurgical Engineers, Petroleum Division, Adolphus Hotel, Dallas, Texas.**
7- 8	**Independent Petroleum Association of America, Mid-Year Meeting, Jefferson Hotel, St. Louis, Missouri.**
20-21	**A.P.I. Mid-Continent Section, Production Division, Tulsa.**
24-25	**Joint Production and Chemical Committee Conference, Sponsored by Technical Section of American Gas Association, Hotel Pennsylvania, New York.**

THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

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The Changing Panorama

Many Trucks Are Out of Service

LACK of drivers, mechanics, repair parts and tires is seriously crippling the truck industry, and, incidentally, cutting into gasoline sales. Seriousness of the dislocation is indicated by results of a study just completed by the Office of Defense Transportation in and about Los Angeles.

Data was gathered from 220 operators, each with 19 or more units, to obtain cross-section statistics from which to compute representative averages of down time.

The 220 companies were operating with 674 of their badly needed trucks out of commission because of being out of order or lacking operators. This meant that 1 out of 10 units was idle. The aggregate of jobs that could not be filled was 2479. Only five operators had sufficient workers to be able occasionally to loan services to some other operator, and then for only a day or so at a time.

Causes of the 674 lay-ups, in the proportion for which each was responsible, are listed as follows: Lack of drivers, 35.5 percent; lack of mechanics, 28.8 percent; lack of repair parts, 29.1 percent; lack of tires, 6.6 percent.

Women Here to Stay In Many Jobs

IT IS too early to predict ultimate affects upon women or upon industry to be brought about by woman's large-scale entry into industrial plants as workers. Unquestionably the whole picture following the war will be colored by what women have been able to do during the war as industrial workers, and it is a safe bet to conclude that from here on out many women workers will remain in industry in some fashion.

Such a conclusion is suggested by findings reported to the recent annual Safety Convention and Exposition, held in New York, by A. J. Gorand, manager of plant protection, Sun Oil Company, Philadelphia. From his paper, "Training Women to Take Over Specific Jobs in the Petroleum Industry," is culled the following observations:

"Women will stick to their tasks under monotonous surroundings better than men and are less inclined to gather fiction out of thin air and present it as fact. They have proved more dexterous in certain types of employment and are neat and clean in their work.

"When you have a definite procedure and it is clearly outlined to women, they accept and adhere to it," said Gorand.

Shell Encouraging Victory Gardens

WITH an objective of approximately 1200 pounds of vegetables produced by each Victory Garden club member, more than 3,000,000 square feet of land will be released to the general public for victory gardens by Shell Oil Company. This move is a part of an extensive program recently inaugurated by the company to encourage the maintenance of victory gardens this spring and summer by the public and by its employes.

It is estimated approximately 12,000 of the company's personnel, east of the Rockies, will join Shell Victory Garden Clubs, and participate in the program which is being undertaken by the company as a wartime project. The purpose of the program is to help the war effort by aggressively promoting the greatest possible growth of vegetables on the "home-front" and the saving of as much food as possible for next winter.

All of the company's vacant land, suitable for gardening and which is not being employed for some useful purpose, will be offered to local civilian defense organizations for release to the public.

To stimulate the greatest possible interest in gardening, and to disseminate worthwhile information on gardening and the saving of garden produce, Shell is sponsoring victory garden clubs throughout its territory.

This fall, the Shell Victory Garden Clubs will hold Victory Food Fairs. They will be conducted along the lines of old-time county fairs, with prizes and ribbons awarded for the best vegetables in each classification. These fairs will be followed by overall contests in each of the company's 18 payroll centers, east of the Rockies, for the most efficient vegetable production per square foot of cultivated ground. Prizes for these production contests, which will put city and country club members on an equal basis, will be War Bonds and Stamps, donated for that purpose by the company.

Reconditioning Work Entering New Era

THE oil industry is entering a period when an increased emphasis should be directed toward increasing the productive capacity and available reserves through reconditioning of existing wells. Growing crude oil requirements, coming at a time when increasing difficulty is being experienced in finding new reserves, when drilling of new wells is limited and when there is a scarcity of steel, are creating conditions that place a premium on improving the output of wells. The ability to boost the productivity of completed wells may well determine whether the industry will be able to meet accelerated consumptive demands.

Fortunately, the technique of reconditioning oil wells is rapidly approaching the stage where a minimum of guesswork has to be relied upon to solve the individual problems. Reconditioning practices are entering a new era. Current technique is reviewed in a comprhensive series of articles, the second of which appears on page 18 of this issue.

Off-the-Job Accidents Costly Manpower Loss

OFF-THE-JOB accidents took more lives and were responsible for more lost-time than injuries at work during 1942. To combat this major cause of industrial absenteeism, the National Safety Council has launched an ambitious campaign against off-the-job accidents.

In 1942 a total of 29,000 workers in the United States met death in off-the-job accidents, as compared with 18,500 kiled at work. Of 4,100,000 non-fatal injuries to workers, 2,350,000 occurred off the job. This toll represents not only a large lose of productive power, but also a great amount of human tragedy and suffering. The man hours of work lost in these off-the-job accidents to workers last year were sufficient to have buit 12,600 heavy bombing planes.

Off-the-job accidents account for a large part of the absenteeism in the oil industry, although not as much as in some of the newer and expanded defense industries.

EDITORIAL COMMENT

Code for Foreign Operations?

By RAY L. DUDLEY, Publisher, The Oil Weekly

WITH many American petroleum authorities expressing the belief that it is only a matter of a few years until the United States may be forced to import oil to help take care of her domestic needs, word from Washington that consideration is being given to petroleum relations abroad is of interest not only to oil men but to the public at large.

Many men believe that within a relatively short period the United States production curve may flatten out, preliminary to a decline. When the decline comes the importation of foreign oil into the United States will take on a new aspect. In the past independent operators have contended that importations were caused in large part by the fact (if it were a fact) that foreign-produced oil was cheaply produced. They maintained that it was being brought into the United States in the face of a plentiful supply of the domestic product which cost more to produce by reason of American standards of wages and living conditions, and various state and federal governmental tax impositions. They pointed to proration below the maximum efficiency of wells to sustain their statements that there was plenty of domestic oil available.

But if oil is brought in from foreign countries because of the need to supplement the domestic supply, and if the price situation at home is reasonably satisfactory, it may well be anticipated that former objections to the importation of foreign oil will not be as stoutly opposed as in the past.

When the time does come for such importations for such reasons, the American public may well ask itself if it would prefer that such importations be made by American companies, concerns domiciled in the United States, and producing abroad, (and for that reason more subject to regulations by our own government) than that such importations be made from oil produced by and bought from foreign governments or even foreign-owned oil companies. That the American public would feel better protected if the foreign sources of such oil were American operated goes without saying.

Thus it would seem that post-war days will see increased activities abroad on the part of American oil capital.

It is because of this situation that in Washington right now consideration is being given to policies which will affect these companies abroad in their relationships with foreign countries.

The thought has been expressed that if a "code of ethics" or an "operating basis" could be developed in advance of the leasing of foreign prospective oil land, it might well keep down such difficulties as have been arising between oil companies and foreign governments. Such a "code" would undoubtedly be worked out in conjunction between American oil companies, the American government and particularly South and Central American governments. Such a code should contain at least the following provisions:

A fair return on the oil produced, to the government on whose land the oil is developed and produced.

Wage standards providing a rate of pay on a par with the best wages of any other comparative industry in the country involved.

Health and sanitary provisions at least on a par with the best provided by any other comparable industry in the country involved.

Use of nationals in the employ of the oil company. This could be determined by fixing the percentage of employes of each company who would have to be nationals of the country involved.

A fair return, if oil is discovered, on the part of the oil company taking the risk.

Such provisions should not be difficult to develop in advance. If developed by conference, they would remove the fear of a foreign country that it was not getting a deal comparable with that which an oil company would be willing to make in the United States or any other country.

If lease agreements were made on such a basis they could easily have back of them a treaty between the United States and the foreign country involved. If an oil company failed to live up to the "code" it would automatically lose the protection of the treaty. If a foreign government so far forgot its treaty obligations as to violate its portion of the agreement, the oil companies would have the moral support of their own government.

Such a code could not be worked out in a day. It should not be worked out without the full participation in it of the countries involved.

Most of the South and Central American nations, but not all, have nationalized their oil rights. Most of them realize that the business of producing and marketing oil is an entirely different business from that of running a government. The experience of at least three governments which have taken over actual development themselves is not sufficiently happy as to cause other governments to emulate their examples. They have found not only that the oil business is a very technical business, involving great outlay of capital, and frequently either losses or long waits for profits, and they have made the major discovery that oil companies did not become great just because they found oil, but that the marketing of the oil is of paramount importance.

There is no reason why American oil companies and governments of other nations should not work in full harmony in the development of the petroleum resources of such countries. There is no reason why full harmony should not work out to the greatest satisfaction on the part of both the governments and the oil companies. The countries want their resources developed. The oil companies want to develop them. The profit motive, be it in money or security, is common or should be, both to the developer and to the country developed.

We believe that something should come of the thinking which is being indulged in along this line in Washington and other places.

Discovery Thinking

If industry is to discover the large volumes necessary to keep supply in balance with future demand it must start thinking in terms of "big" geology, which means in terms of wholly new oil provinces instead of individual fields, and square miles in place of acres

By A. I. LEVORSEN, Geologist, Tulsa, Oklahoma

An address before annual meeting of American Association of Petroleum Geologists, April 7, 1943, Fort Worth, Texas.

EVERY man, woman, and child in the United States had a stake in the oil industry during times of peace, but now that we are at war, the stake is infinitely greater, for, as top ranking government officials say, "petroleum is one of the most essential of war industries."[1] This stake is expressed in many ways; through ownership in the industry; in utilization of its products as fuel, power or raw materials; in an appreciation of the many taxes paid by the oil industry; and finally, in the applications of petroleum and its products to war. The affairs of the petroleum industry have outgrown the simple business of producing, manufacturing and selling petroleum and its products and they are now of universal military, economic, social and political importance. As a matter of fact, the public is in the oil industry and probably here to stay.

Because of this public interest in petroleum, society in planning and thinking of its future has the right continually to ask "How long can we depend on a supply of petroleum adequate for our needs?" "What about the future reserves?" "Can we continue to build an economy based on an abundance of raw materials in the form of petroleum and gas?" And we in the oil industry, as the custodians of this national resource, should continually be prepared to give answer so that the time does not come when the public finds that it has been misled; when, instead of scarcity there is plenty; or when, instead of plenty there is scarcity. Much planning—economic, military and political—will be affected by the answer and it becomes a public responsibility that the answer be as accurate and as up-to-date as possible.

In approaching such a problem as this, it is well first to get some idea of its size and proportions. The problem from a national viewpoint is not

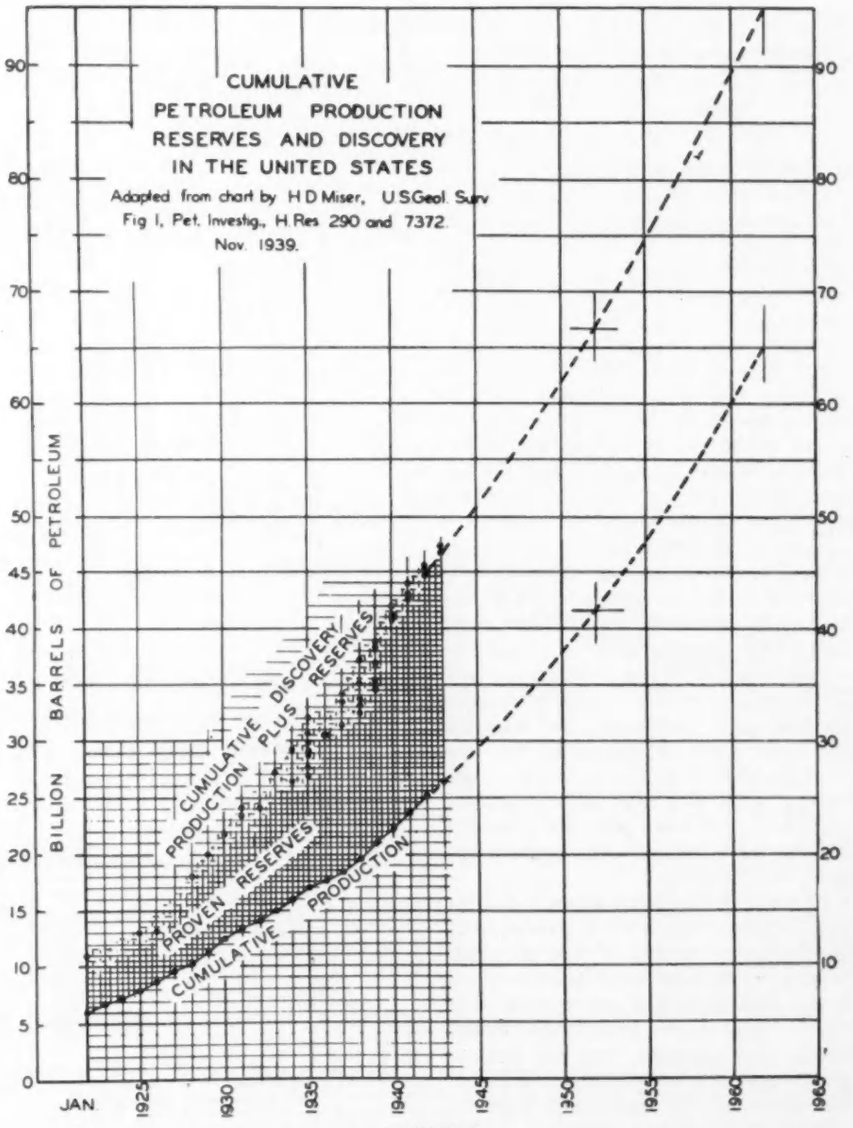


FIGURE 1

Chart showing, through use of cumulative curves, past trends in petroleum production and reserves in the United States. When projected into the future, they give some indication of the magnitude of the discovery problem if we would continue to maintain present trends. The upper black dots indicate estimates of reserves by various authorities in different years.

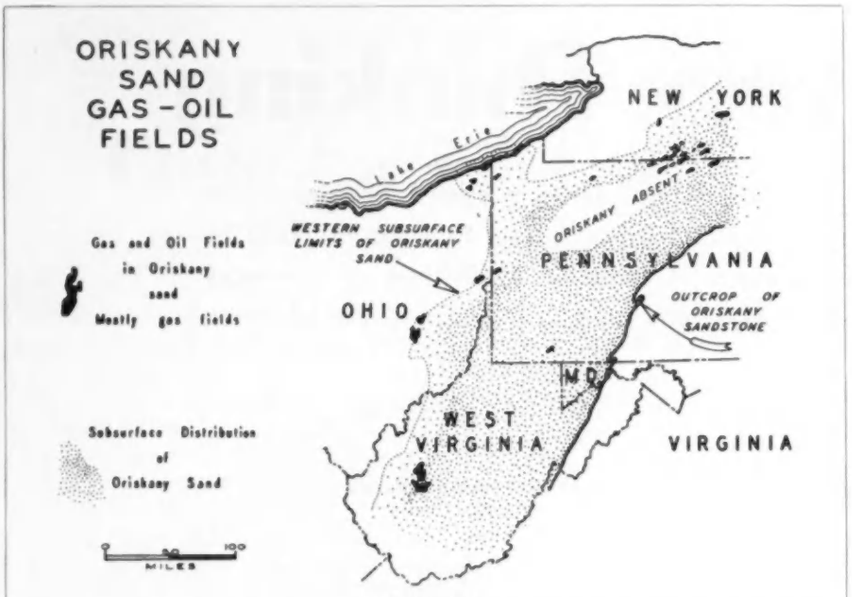


FIGURE 2

Map showing the subsurface distribution of the Oriskany sand (Lower Devonian). The sand thins out up the dip towards the northwest and it is along this belt of wedging out of porosity that the gas and oil fields producing from the Oriskany sand are found. Many of the fields are in local anticlinal folds.

the same as it is from the viewpoint of the individual or even that of a major oil company, because their needs are but infinitesimal by comparison. The chart in Figure 1 is designed to indicate the future needs by the projection of our past record of growing supply and demand. Here we see that during the next 20 years, or by 1963, if we are to maintain the same rate of increase in production as in the last 20 years, and if we are to continue to have as a discovered reserve 13 or 14 times the annual production, it will be necessary that there be discovered the staggering amount of 50 billion barrels of new oil. This is a greater amount than has been discovered by all methods since the beginning of the oil industry 80 years ago. The present trends, when projected into the future, indicate a steadily increasing tempo of discovery, production, and consumption. We are talking about a lot of oil and in the light of our current decline in rates of discovery in the face of steadily increasing war needs, we have something deserving the most serious and careful attention.

Experience has demonstrated that the uses of petroleum have expanded with the expanding supply. When there has been an extra amount of petroleum, industry has developed new uses to take up the surplus. We have recently seen how a local shortage—due, it is true, to a shortage in transportation, but in effect a shortage in petroleum, nevertheless—quickly caused a shifting to other sources of energy and heat. This may well be the clue as to what will happen at any future time if a shortage of petroleum should develop. Since the supply of petroleum is a direct result of discoveries of new oil pools, it is quite obvious that the key to the whole question of future supply rests in the ability of the industry to make the necessary discoveries. Failing to discover new pools, the entire economy dependent on petroleum is affected.

Since no one can know in any exact or even approximate sense what the discoveries of a year, or even a month in advance may be, another problem is to decide what sort of an approach can be made toward some reasonable idea as to the amount and location of the future petroleum reserves. It seems to me that the only answer available to us is that the approach must be made through the reason and philosophy which result from past experience and which may be applied to the future. The best we can hope to do is to add to our present small supply of philosophy concerning the relations of petroleum to geology, then to apply all such understanding to our knowledge of geological conditions. From that we may decide whether or not there is reason to believe that there are adequate reserves remaining to be discovered, and also how the discoveries may be made. Our answer will be a function of our philosophy, of our theories and of our thinking.

This has been most effectively stated by Pratt[2] when, in discussing the lack of successful discovery in many of the foreign countries, he states:

". . . The suspicion grows that physical conditions within the earth's crust impose fewer and less formidable obstacles to the development of commercial oil fields over much of the land area of the globe than are raised up by our prevailing mental and social climates of opinion. The limitations put upon the discovery of oil on earth today are more

FIGURE 4

The pools of the Illinois basin region are located in the region of up-dip wedging out of the numerous sands and reservoir rocks of the Chester or Upper Mississippian Series. The area now underlain by the Chester rocks in the Illinois basin is but a small segment of the area originally a part of the wedge belt. The Chester rocks extended toward the southeast into Arkansas and Oklahoma and toward the east into the Appalachian states and toward the south into Alabama. (See A. I. Levorsen, "Pennsylvanian Overlap in United States," Bull. Amer. Assoc. Petrol. Geol., Vol. 15, No. 2, February 1931, pp. 118-148; and "Studies in Paleogeology," Bull. Amer. Assoc. Petrol. Geol., Vol. 17, No. 9, Sept. 1933, pp. 1107-1132, particularly Figure 2.

FIGURE 3

Map showing the subsurface distribution of the Clinton sand (Silurian) with the gas and oil fields associated with its thinning out up-dip towards the west and the subsurface distribution of the porous dolomite portion of the Trenton formation (Ordovician) with the oil and gas fields associated with the up-dip edge of porosity. Individual pools in both provinces are in part on local structure but mostly associated with local porosity.

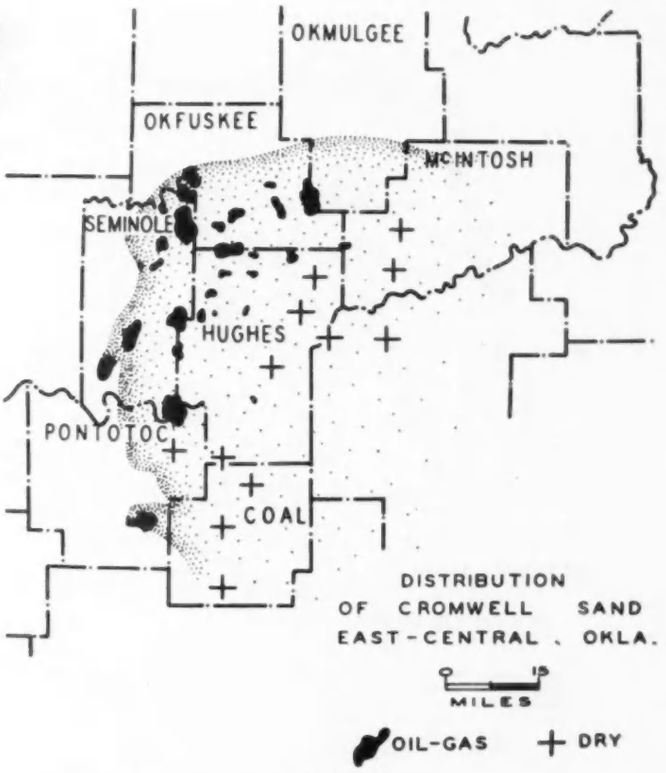


FIGURE 5

Map showing subsurface distribution of the Cromwell sand (Pennsylvanian) in east central Oklahoma. Oil and gas fields, most of which are located on local anticlines, are shown in black and the crosses mark the location of equally good or often better anticlines which are dry in the same formation. The association of the oil fields with the up-dip wedging out of the sand is evident.

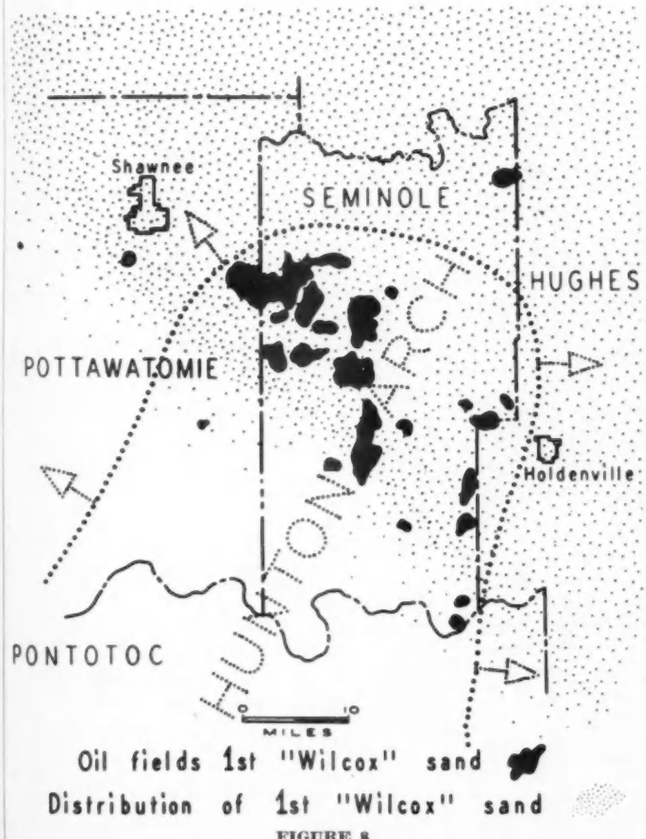


FIGURE 8

A characteristic section along the Gulf Coast showing the up-dip wedging out of most of the producing sands.

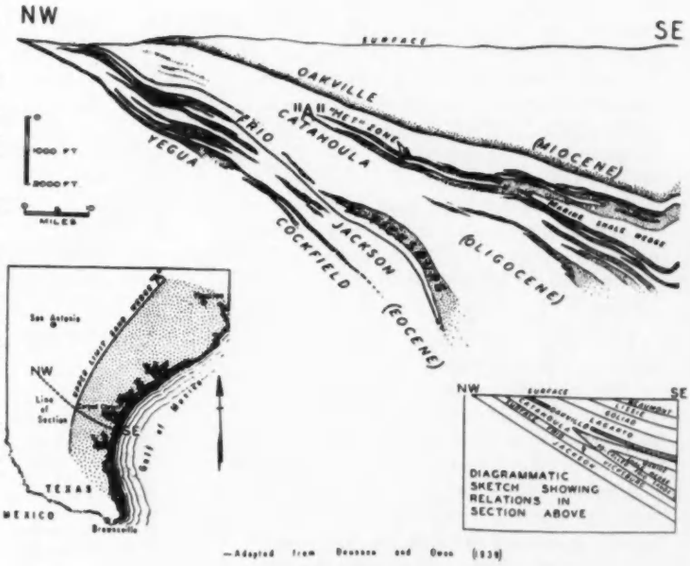


FIGURE 6

The First "Wilcox" sand (Ordovician) grades out into dolomite and limestone toward the southwest as shown in the drawing. The Hunton arch crosses the edge of porosity as it pitches to the northeast and within the area arch where it crosses the wedging out of the sand are found the rich pools of the Seminole District in Oklahoma. The individual pools are localized by up-folds and local deformation and the province is localized by a combination of favorable stratigraphy and regional arching.

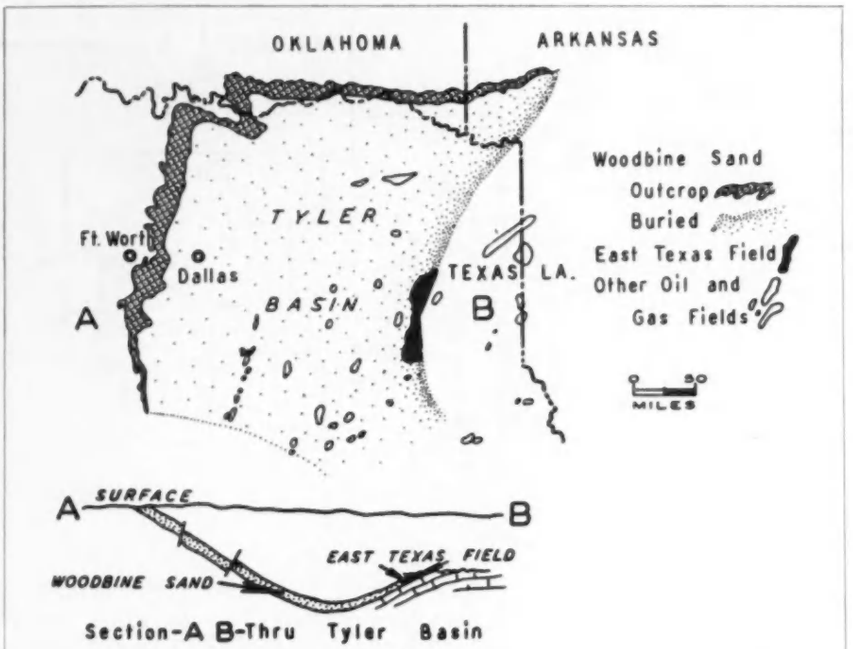


FIGURE 7

Map showing the outcrop and subsurface distribution of the Woodbine sand (Upper Cretaceous) in northeastern Texas with the East Texas oil field located along the eastern, up-dip wedge edge of porosity. In this case the wedge edge is the result of uplift and truncation of the Woodbine sand with a subsequent overlap of younger formations.

mental and social than physical. Gold is where you find it, as the old adage has it, but oil must be sought, first at least, in the mind. . . ."

While much oil has been discovered by purely random drilling, and much will most assuredly be discovered through such means in the future, yet the only rational way to make available to society the oil and gas which now lies underground as the undiscovered reserve, is through the application of scientific methods and reasoning. It is the one approach which offers reproducible results. A correct scientific principle applied to the accumulation and occurrence of oil and gas can be applied repeatedly to Oklahoma, to the United States, or throughout the world—this year, next year, or a hundred years from now. It becomes a foundation upon which we can build indefinitely into the future.

The occurrence and distribution of oil and gas deposits are intimately related to the occurrence and distribution of varying kinds of geological conditions, and because of this relation, the problem of where to search for oil pools and what might be expected to result from this search is fundamentally geological in nature. Within the oil industry, the petroleum geologist is the one to provide the answer as to the adequacy of our petroleum reserves and as to the methods by which they may be discovered. By a petroleum geologist is meant one who is engaged in the interpretation of the relations of the rocks to the occurrence and production of petroleum, whether he began as a paleontologist, a mineralogist, a geophysicist, a geochemist, or as an academic geologist. This problem of the discovery of an adequate oil supply becomes our responsibility to the industry and in turn to the nation.

Since the petroleum geologist is the one whose primary purpose is to guide the discovery effort, it can readily be seen that he occupies a most important post in the petroleum economy—in fact he may well be considered as the keystone in the arch of that part of our future national economy which is dependent on petroleum whether as a source of power, a fuel, or as a raw material. Truly, geology in all of its history has never reached such a plane of useful application to humanity. The size of the problem gives one real cause to approach an answer in a spirit of deep humility.

As we have seen, the normal future expansion of the petroleum industry calls for discoveries on a scale which to many is almost, if not, impossible of achievement. Some feel that the decline in discovery rate is because of the approaching exhaustion of our ultimate reserves—that we are scraping the bottom of the barrel, in other words. If this should prove to be the case, the situation is indeed serious. On the other hand it may be due to an insufficient discovery effort in which case something can be done about it.

The first part of what follows is intended as a contribution to our foundation of geological principles which apply to the search for new reserves in the form of new oil provinces. At best it can be but a few facets of an infinitely large and broad subject—but a subject upon which we must give continual attention if we are to utilize and apply the ever-increasing mass of new data being discovered daily throughout the oil areas. Principles, without data on which to apply them, are of academic interest

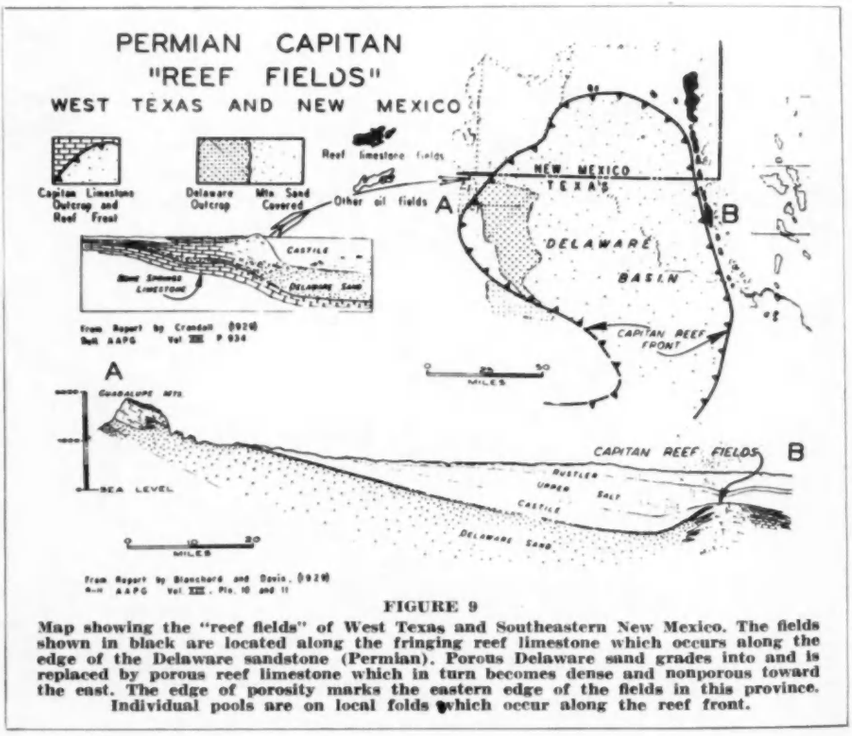


FIGURE 9

Map showing the "reef fields" of West Texas and Southeastern New Mexico. The fields shown in black are located along the fringing reef limestone which occurs along the edge of the Delaware sandstone (Permian). Porous Delaware sand grades into and is replaced by porous reef limestone which in turn becomes dense and nonporous toward the east. The edge of porosity marks the eastern edge of the fields in this province. Individual pools are on local folds which occur along the reef front.

only, but data without principles by which they might be applied, are useless, costly and wasteful.

The second part, which will be published in two installments, is concerned with some ideas for improving the discovery effort from a strictly geological viewpoint.

Undiscovered Reserves

Whether the declining discovery is the result of lack of oil to be discovered, or to lack of effort, there is one factor which enters into the over-all problem and that is, that from a national viewpoint we are too often thinking in too small terms. By far the greatest part of our effort is in searching for extensions to pools already discovered, in searching for deeper sands, and in working and reworking progressively smaller and smaller areas within the developed provinces. We finally get to think almost exclusively in terms of individual oil fields, when we should be thinking in terms of oil provinces; in discoveries of millions of barrels, when we should be thinking in terms of billions of barrels; and in acres of new production when we should be thinking in square miles. If you agree that our work is essential to the future oil supply of the nation, it means that we must turn an increasing part of our thinking into terms of not one but many wholly new oil provinces. It means that we must attempt to think in terms of a steady procession of major oil discoveries into the future. It means that we must think in terms of "big" geology so that we may be assured of "big" results.

In order to reduce this discussion to more concrete terms and to everyday experience, two types of geological concepts or principles are presented to show the kind and the scale of thinking that seems to be called for in an attempt to formulate a better idea of the nature and the extent of the undiscovered reserves of petroleum in the United States. The layman may say, with a wave of his hand, "There are plenty of reserves, we have always found enough, why worry?", but we, who are technically trained, must attempt at least to put the answer into terms which can be justified by geological reasoning based on experience and applied to known geological conditions.

The first of these principles has to do with up-dip wedge belts of porosity in reservoir rocks and the second has to do with the layers of geology which are separated by unconformities. They may be considered as principles bearing on the occurrence of oil provinces, both discovered and undiscovered, and it is hoped that an understanding of them will enlarge and clarify your concepts

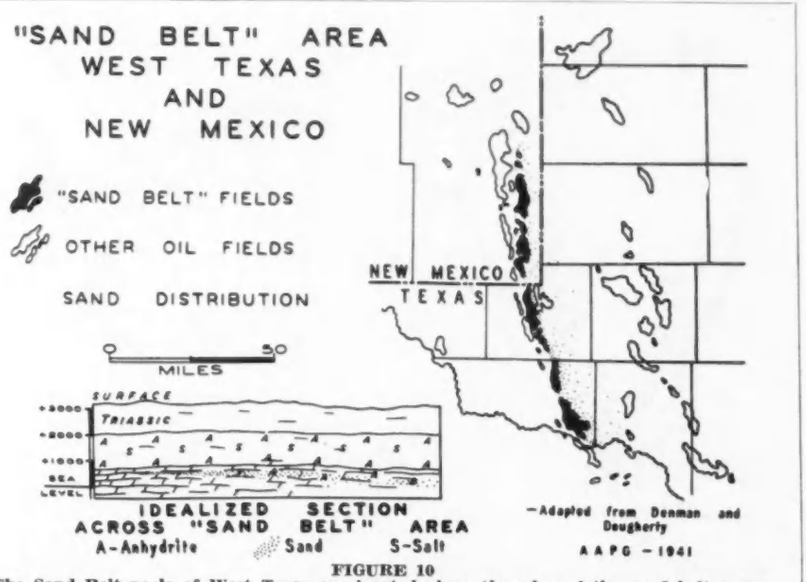


FIGURE 10
The Sand Belt pools of West Texas are located along the edge of the sand belt occurring in the upper part of the Permian lime on the back or lagoonal side of the fringing reefs.

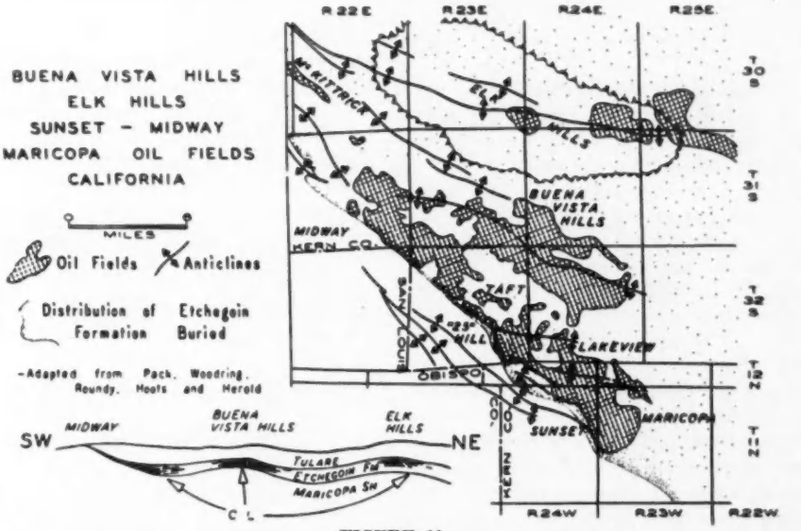


FIGURE 11
The production in the Midway-Sunset-Buena Vista province in California occurs in the vicinity of the up-dip wedge edge of the Etchegoin formation (Pliocene). The sands go out towards the southwest where they are buttressed against the rising underlying Maricopa shales along the edge of a depositional basin in Etchegoin time. Individual pools are both associated with local folding and with variable sand conditions.

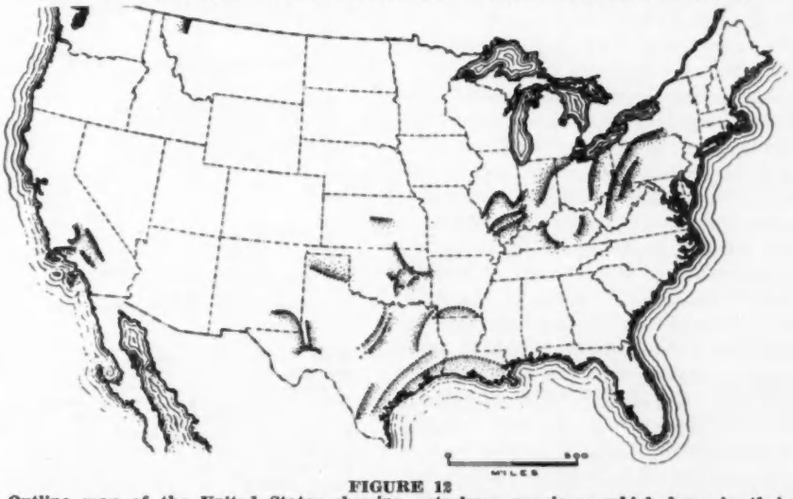


FIGURE 12
Outline map of the United States showing petroleum provinces which have in their early history an up-dip wedging out of porosity in the reservoir rock.

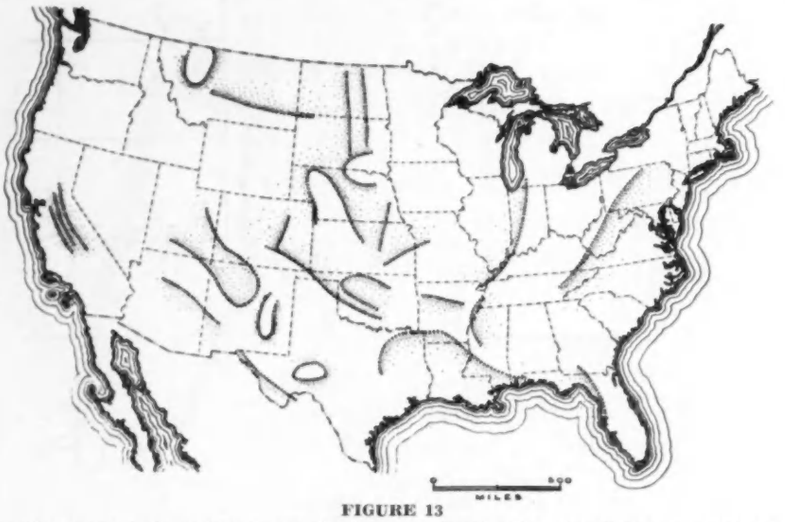


FIGURE 13

Outline map of the United States showing over 10,000 miles of well known essentially unexplored up-dip wedge belts of porosity. Confidential data in the files of the oil industry probably will double the number and mileage of these belts, and an additional like amount undoubtedly will be added during the development of those now known.

of the occurrence of oil as they have mine.

Wedge Belts of Porosity: From Pennsylvania to California and from the Ordovician to the Tertiary, we find that oil province after oil province is located in close association with the up-dip wedging out of the porosity in the reservoir rock. This association is not coincidental nor occasional, as will be seen from the familiar examples which follow, but is a principle which is fundamental to many or probably most of the oil provinces of the United States. The implications of such a philosophy are far-reaching.

Beginning in the eastern United States and moving over the country to California, there are many examples of this relationship and those that follow are selected to show some of the many variations in geological conditions in which the principle is expressed.

These wedge belts of porosity are only a part of those that can be shown to be related to the present distribution of oil and gas pools. Other familiar examples are the Appalachian fields in the Mississippian and Devonian sands; the "Corniferous" production flanking the Cincinnati arch in Kentucky; the Simpson Bartlesville and Burbank sand production of northeastern Oklahoma; many of the pools of North Central Texas producing from sands of Pennsylvanian age; many pools in the Laredo district of South Texas; the Lower Cretaceous production of Arkansas and Louisiana; and pools in the Santa Maria Valley, the Eocene and Miocene production in the vicinity of the Coalinga nose; and much of the "East Side" production of the San Joaquin Valley in California. The areas mentioned are shown in Figure 12.

The origin of a porosity wedge seems to be of less importance than the fact that there is a porosity wedge present. Thus some wedges are the result of a lateral change of facies from sand to shale; others a change from porous limestone or dolomite to nonporous limestone or dolomite; while others are the result of uplifts, truncation and overlap. The physical presence of an up-dip wedging out of porosity, irrespective of origin, seems to be the important factor rather than the nature of its origin.

Application: The application of the principle of wedge belts is simple. If you accept in your thinking an up-dip wedge edge of porosity in the reservoir rock, whatever the cause, as a fundamental prerequisite to the formation of many or most oil provinces, then you have immediately expanded your concept of the undiscovered petroleum reserves of the United States almost without limit. This is because there are thousands of miles of buried, up-dip, wedge belts of porosity, in rocks which are known to produce oil and gas elsewhere, and yet which are today only partly explored or completely unexplored. A wedge belt is the clue to a province whereas a local fold is the clue to a pool.

Figure 13 shows upwards of ten thousand miles of such wedge belts remaining to be explored. Fundamentally they represent the same type of geology which has in the past produced half a billion barrels of oil in the dolomite wedge belt of the Trenton formation of Indiana and Ohio; the same kind of geology which has and will produce 4 billion or more barrels of oil in the 60-mile porosity wedge known as the East Texas field; or which has produced over a billion barrels of oil along the wedge known as the Midway-Sunset district of California. The evidence for these unexplored wedges is almost entirely in the geologic literature and they are each well known to most geologists. In some instances the evidence is largely the result of surface mapping, in others it is the result of a few test wells, and in still others it is the result of various combinations of well known

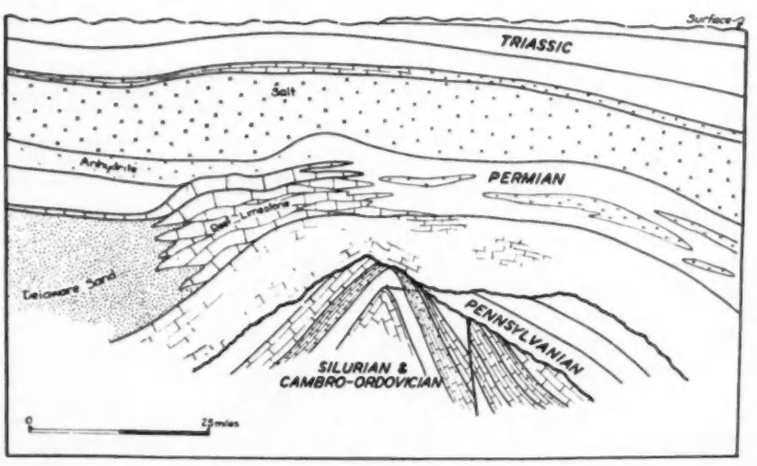


FIGURE 16

West Texas and southeastern New Mexico is underlain by a number of layers of geology. The upper layer of Triassic and Cretaceous rocks has a uniform, low, southeastward dip. The Permian with its highly productive reef limestones grading into thick sandstones on one side and into anhydrites and shales on the other occurs next below. Underlying the Permian is found a variable section of Pennsylvanian rocks ranging from thick dark shales to almost solid limestones. Next below comes the complicated layer of early Paleozoic—Devonian, Silurian, Ordovician and Cambrian. The petroleum geology of each layer differs from each of the other layers, the layers are separated from the others by unconformities, and each is quite independent of the others.

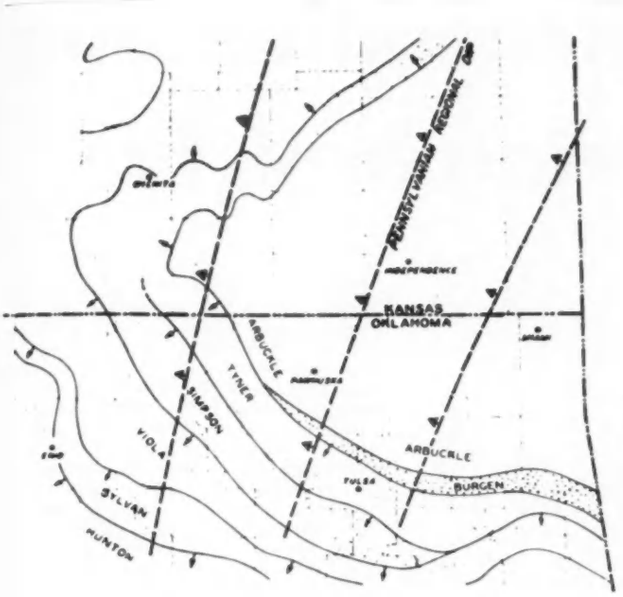
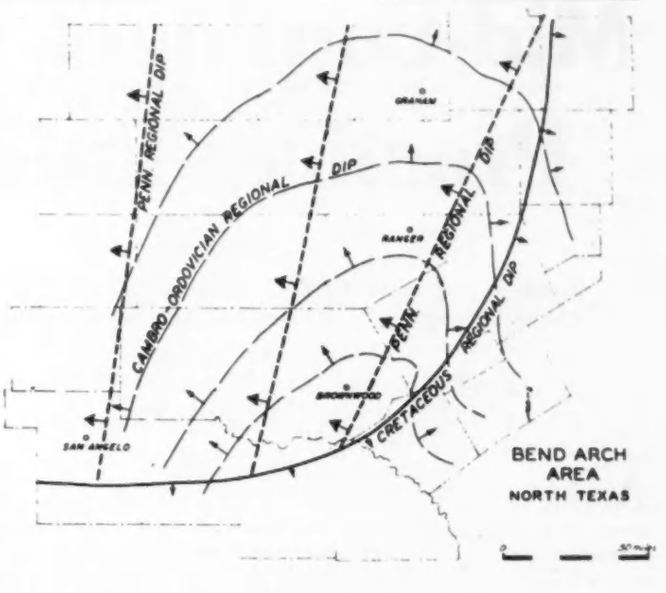


FIGURE 14

Southeastern Kansas and northeastern Oklahoma showing two layers of geology. The upper layer, consisting of Pennsylvanian and Mississippian rocks has a regular north northeast strike and a dip towards the west. The lower layer consisting of Ordovician and earlier rocks is in the form of a broad arch, pitching toward the west, and forming the western end of the Ozark uplift. The two layers are separated by an unconformity and the general geology, as well as the petroleum geology, are quite distinct in each of the layers.



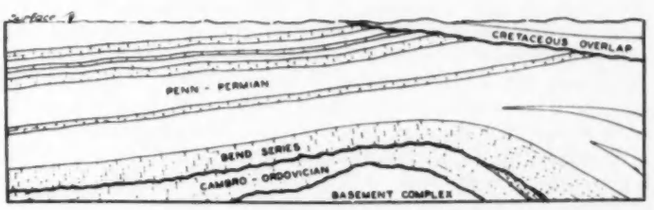


FIGURE 15

The Bend Arch region of North Central Texas in which three layers of geology exist. The upper layer consists of the Cretaceous rocks which are in the form of a broad southeastward pitching arch. Below the Cretaceous layer, the Pennsylvanian layer is found striking north and northeast and dipping uniformly toward the west. Below comes the Bend Arch of Lower Pennsylvanian, Mississippian and Ordovician rocks. Each layer has its own petroleum geology, is separated from the others by unconformities, and acts quite independent of the others.

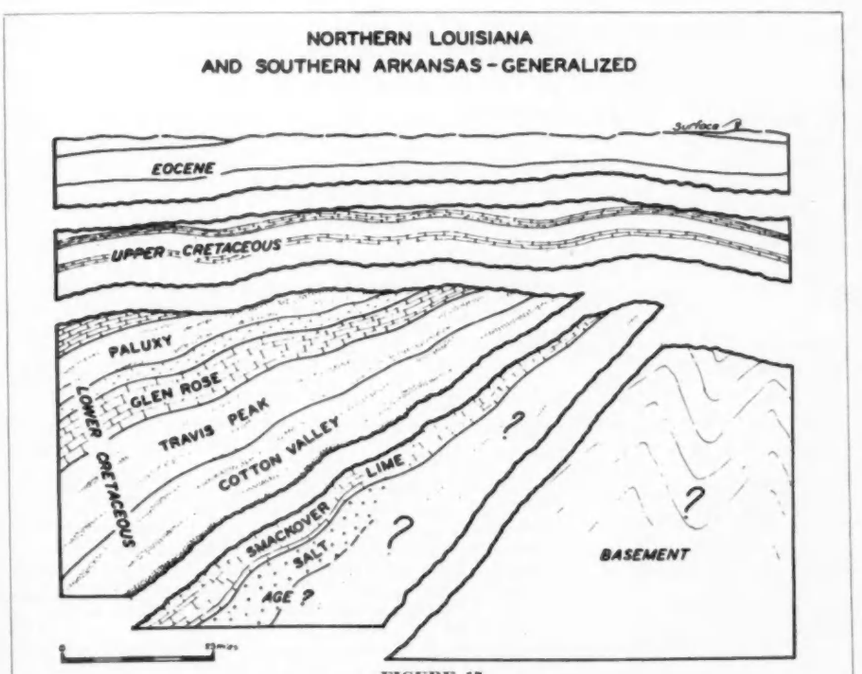


FIGURE 17

Northern Louisiana and southern Arkansas is another area in which numerous layers of geology are found superimposed on each other. Each layer is separated from the other by an unconformity, each has its own peculiarities of oil and gas geology and therefore must be prospected differently than the others, and each is independent of the others. There are no clues in the upper layers as to what may be expected in the next lower layer and each layer must be considered as a unit.

surface and subsurface data. If the confidential data in the hands of the oil companies were available, it is probable that as many more miles of unexplored wedge belts of porosity would be known as are known today. If to that is added the new wedge belts of porosity which will most certainly be discovered in the exploration of those wedges now known, the ultimate number of miles which remain to be explored should be sufficient to satisfy the most pessimistic of geologists for many years.

Layers of Geology: A second principle of geology which has a wide application to petroleum geology is the concept of successive layers of geology in the earth, each separated by an unconformity. They are present in most of the sedimentary regions of the United States and will probably be found to prevail the world over. The discovery of these layers of geology is generally the result of drilling and many discoveries of oil have been contemporaneous with discoveries of totally unsuspected geology as well. In a few of the well developed oil areas, a rather complete understanding of these layers can be obtained while in most other

[*Continued on page 26*]

Mid-Continent Reconditioning Practices Entering New Era

PART 2

Problem of Increasing the Drainage Efficiency of a Well by Either Extending Its Vertical or Lateral Sphere of Drainage

By L. E. ELKINS, R. H. SMITH, L. F. PETERSON, and P. P. MANION, JR.
Stanolind Oil & Gas Company

THIS is the second of a three-part article on reconditioning of wells. The first part, which appeared in The OIL WEEKLY of March 29, contained a general introduction and then took up the problem of eliminating extraneous forces and their restricted action on the normal flow of oil and gas. The third part, to be published in an early issue, will discuss means of reconditioning wells to establish selective withdrawal and thus conserve energy or reduce lifting expense through reduction of free gas or excess water production.

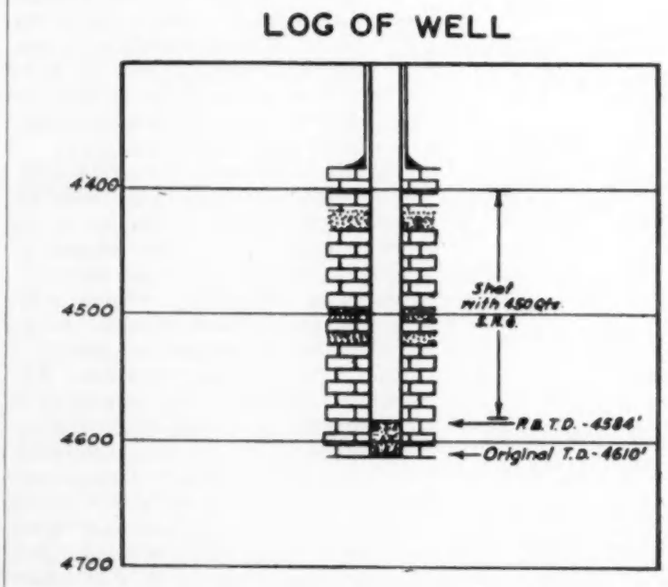
This article is published by permission of the American Institute of Mining and Metallurgical Engineers, before which the paper was presented at its annual meeting in New York on February 16, 1943.

AFTER an operator is satisfied that there is no plugging agent or other extraneous force limiting the well's productivity from the zones penetrated, as discussed in Part 1, he should then consider the possibilities of reconditioning the well through increasing its drainage efficiency, which may be done by either extending its vertical or lateral sphere of drainage. To increase the efficiency of drainage, the relation of the penetrating well bore to the natural distribution of permeable channels must be altered in some way.

Extending the Vertical Drainage Sphere: Let us first consider the need of exending the vertical drainage sphere. It is, of course, fundamental that there must be permeable channels connecting zones of porosity to the penetrating well bore, or there cannot be drainage. The need for extending the vertical sphere of drainage usually is limited to partially penetrating wells in stratified pay zones. The field for this type work is probably most prevalent in limestone reservoirs predominantly under volumetric control, or in thick stratified sand or limestone reservoirs under hydraulic control with water encroachment primarily restricted to channels parallel with the dip of the pay formation.

Reconditioning, by deepening old wells, is necessary and logical in many Mid-Continent fields. In the first place, many wells have only partially penetrated producing zones because in the initial development campaign it was logical to forestall the possibility of bottom water production as long as possible. However, many times there are undrained reserves below the depth of penetration. These reserves are usually worth going after. After a sustained period of time, reserves of this nature may be partially drained by other wells penetrating the entire section, or through channels of limited permeability connecting the unpenetrated zone with the low pressure depleted zone from which the well has been producing.

Even in new fields, subject to proration, there is an incentive to deepening partially penetrating wells to their maximum safe penetration above true bottom water. If the proration formula includes potential or productivity as a factor, and if such a factor is a function of pay thickness, then an operator should consider deepening a good well just to increase his rate of allowable and protect him from whatever disad-

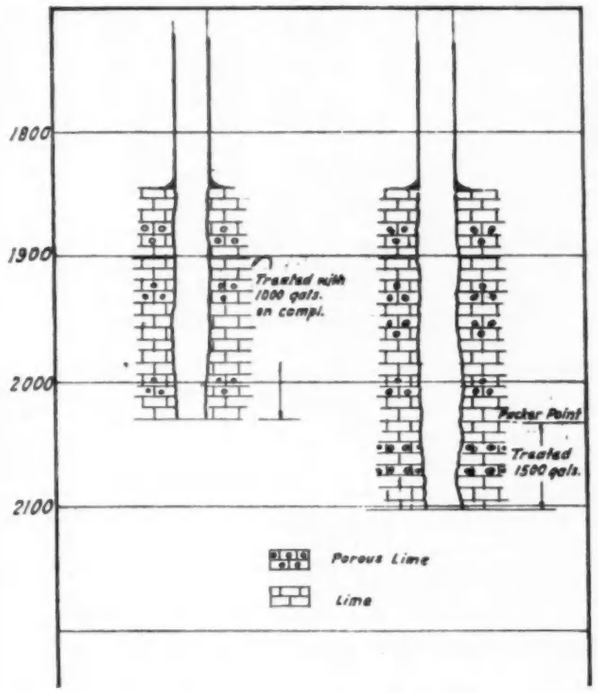


CASE No. 5

To Illustrate How Water Presence in Some Types of Limestone Reservoirs Might Falsely be Considered as "True" Bottom Water and Penetration Thus Restricted to That Datum

WELL COMPLETED:
January 1, 1941.

POTENTIAL TEST:
Pumped 120 barrels of oil and 312 barrels of water in 24 hours. (72 percent water.)
Water percentage declined on regular allowable schedule from 50-75 percent to 10 percent in July, 1941, and well started flowing. Since July, 1941, water percentage further declined to clean oil production in August, 1942, and well has produced clean oil since this date.
Well drilled in with cable tools in hole. Well was plugged back on completion but water was not eliminated. Later wells, lower on structure and with as great, or more penetration, came in making clean oil or water soon exhausted.



CASE No. 6

To Increase the Vertical Sphere of Drainage by Increasing Penetration in a Limestone Section With Stratified Porosity Development. Also Illustrates the Use of Selective Acid Treatment With a Packer

WELL COMPLETED:
December 22, 1934.

PRODUCTION BEFORE WORKOVER:
8 barrels of oil and 2 barrels of water per day (well had been acidized once previously).

PRODUCTION AFTER WORKOVER:
76 barrels of oil and 13 barrels of water.

WORKOVER PROCEDURE:
1. Deepened with cable tools through an interval of 72 feet, from 2030 to 2102 feet; new interval had 22 feet of net effective pay thickness.
2. Newly penetrated section tested 10 barrels oil and 1 barrel water natural.
3. Treated newly penetrated section with 1500 gallons of acid with packer at 2033 feet.
4. Packer pulled and entire section tested 76 barrels oil and 13 barrels water.

Productivity of well remains practically unchanged in 7 months since workover. Most recent test was 31 barrels oil and 8 barrels water in 12 hours, and the daily allowable is 23 barrels per day.

vantage in drainage that might otherwise exist. The limit of penetration should be controlled by the relation of the well depth to a "true" bottom water zone. It is, of course, preferable to leave an impermeable zone between the well depth and "true" bottom water because even though it may be inactive regionally, the local distribution of reservoir pressure and other reservoir conditions may be such that a water cone would develop, and although it might not be permanent, it would inconvenience operations and restrict oil productivity for some time.

The reference to "true" bottom water is emphasized because in many limestone reservoirs with a low degree of permeability, water is often found in small isolated zones and is exhausted a few months after being placed on production. The appearance of this type water has confused the interpretation of water levels and productive limits in some limestone pools and has resulted in completion programs which will require considerable deepening work to properly exploit the reservoir.

Cases Nos. 5, 6, and 7 will illustrate the need for deepening operations to properly recover oil from zones not previously penetrated.

Case No. 5 represents conditions which developed in a number of wells at lower structural positions in a field in West Texas. The exhaustion of the water indicated that development could proceed further down structure and also has indicated that a number of earlier drilled wells may have to be deepened to effectively drain the reservoir.

Case No. 6 illustrates the advantages to be gained both from the standpoint of productivity and that of increasing reserves.

Case No. 7 is typical of a well deepened to increase its productivity and, therefore, its allowable. This is a well drilled early in the life of a pool, and was stopped because of a "false" bottom water point. Later, offset wells took complete penetration, and over a long period of time the deeper pays beneath this well could have been partially drained by other interests had it not been deepened.

Extending the Lateral Drainage Area: The field of extending the lateral drainage of a well by reconditioning is probably much wider than that through deepening and, in the authors' opinion, is one of the most important problems facing the average operator. The technique applicable to this type of reconditioning to some degree overlaps the third major type of reconditioning—selective withdrawal; nevertheless, such is of sufficient importance to treat it separately.

The main object of this type of reconditioning is to increase the natural permeability of the penetrated producing zones and thus extend the lateral drainage limits. The two most recognized methods for accomplishing this are acid treatment and shooting with explosives. Some may question the ascribing of an increase in recovery to acid treatment or shooting, but as long as oil has to be produced within certain economic limits, there is a very decided increase in ultimate recovery that must be credited to these processes; and in many fields, they have converted what would otherwise be classed as dry-hole areas into major oil fields. Also, a number of fields developed and produced to apparent depletion before acid treatment technique had been developed, were rejuvenated and additional recovery of reserves was thereby definitely attributable to acidizing. A third, but less prominent, method of obtaining lateral penetration involves mechanical means such as horizontal drilling which may have some special application.

The two primary considerations with regard to these types of reconditioning are: (1) Is there sufficient oil remaining to be recovered? and (2) What is the proper technique for doing the work? The answer to the first consideration is usually obtained from one or two sources. The first source, which is the operator's knowledge of the reservoir conditions, original oil in place, recognition of drainage limits, etc., may indicate that insufficient oil has been recovered. This conclusion, however, will usually be supported with a second source; namely, actual results of experimental reconditioning programs.

Generally speaking, of the two processes, shooting and acidizing, the latter is most important to the Mid-Continent operator when one stays purely within the reconditioning field as heretofore defined. In an area where shooting is desirable or applicable, the wells are usually shot on completion and it has not been general practice to go back to

reshoot wells during the reconditioning stages. Once the section is well fractured and drainage channels are opened up, it is usually possible to keep them open by other means than reshooting. Lateral penetration by horizontal drilling is limited both by mechanical difficulties and by fields of application yet it is likely to play a significant role in some reconditioning problems.

Of course, the first requirement for a successful acid treatment is that the formation in which the porosity is developed must, to some degree, be soluble in acid. It has been found in some limestone reservoirs that the pores are lined with a secondary deposit of anhydrite, a substance insoluble in acid, while the limestone formation itself is very soluble. Such a situation often complicates the problem of acidizing unless the operator has carefully tested the effects of acid on increasing permeability rather than its ability to dissolve a sample of the core, however, an operator cannot ignore this condition very long because his policy will be guided by results. The problem of acid solubility will not be considered further in this paper.

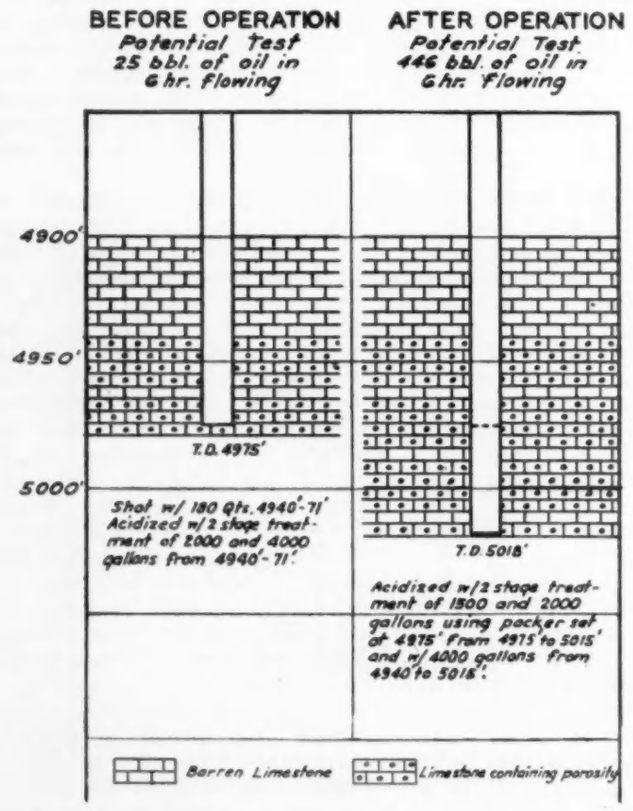
The real acidizing problem in any treatment, and especially in reconditioning wells, is to determine in what part of the section the acid should go and then control it so that it will go there. If acid is merely pumped into a well, and especially one penetrating a section substantially depleted, it will enter the most permeable section which is also the section most likely depleted. Thus, a great part of the acid may be spent in a section in which little or no good can be accomplished. Generally speaking, the increase in recovery from limestone sections with a varying permeability profile will be substantially credited to increasing peremability in the tighter zones, directing acid to these zones may either reduce resistance to flow already established, or it may open a new channel to a porous zone not previously connected to the well bore.

So the problem first at hand is to determine in some way at least an approximate permeability profile. Core analysis and electrical logs, while of great value in sand pools, often are inadequate for such a determination in limestone reservoirs. Drilling time, sample analyses, drill stem tests, etc., offer some information as to this determination but often such testing was not performed and in many instances it is incomplete and inconclusive. A permeability profile can be measured on a well without having any test data obtained while drilling. Fluid input tests can be conducted by selective input tests using packers after calipering the well bore for locating packer points. The ability of different parts of a pay zone to take fluid is an index of permeability. Probably the simplest method involves the use of an acid service company's "Electric Pilot" which can be used to detect the depth of an oil-water interface in a well. This permits determining an accurate permeabiilty profile with or without tubing in a well. (See Case No. 8 for a description of this process.)

Although Case No. 8 shows how a permeability profile can be determined in open hole, the same objective can be accomplished by running the "Electric Pilot" on the tubing. In following this application, the object is to hold an oil-water interface at a constant position opposite the pay section by varying tubing and casing input pressures while pumping either oil or water in the tubing and the other in the annular space. The fluid input rate into the tubing is a function of the permeability below the interface, and the rate into the casing is controlled by the permeability above the interface, then, by raising or lowering the tubing and the attached "Electric Pilot" to different positions within the pay section, a detailed permeability profile can be established.

It may often be necessary to caliper the well bore before an accurate perme-

MECHANICAL CONDITION OF WELL


BEFORE OPERATION
Potential Test
25 bbl. of oil in
6 hr. Flowing
AFTER OPERATION
Potential Test
446 bbl. of oil in
6 hr. Flowing
4900'
4950'
5000'
T.D. 4975'
Shot w/ 180 Qts. 4940'-71'
Acidized w/2 stage treatment of 2000 and 4000 gallons from 4940'-71'.
T.D. 5018'
Acidized w/2 stage treatment of 1500 and 2000 gallons using packer set at 4975' from 4975' to 5015' and w/4000 gallons from 4940' to 5018'.
Barren Limestone
Limestone containing porosity

CASE No. 7

Partial Penetrating Well in Stratified Limestone Section Deepened to Increase Productivity and Make Available New Reserves Previously Not Reached by Drainage Area of Well

The field from which this well is producing is prorated on potential and acreage. By deepening this well, increased potential resulted in a larger allowable and also made available reserves not recoverable with previous penetration.

WORKOVER PROCEDURE:

1. **Killed well and pulled tubing.**
2. **Rigged up small portable rotary drilling unit and drilled deeper, using the reverse circulation process with oil as the fluid medium.**
3. **After drilling to the desired penetration (which was governed by known water level) the new formation drilled was acidized with two-stage treatment of 1500 and 2000 gallons with acid controlled by packer.**
4. **The entire pay section was retreated with 4000 gallons of acid.**
5. **The well was put back on production and tested 446 barrels of oil in 6 hours, flowing.**

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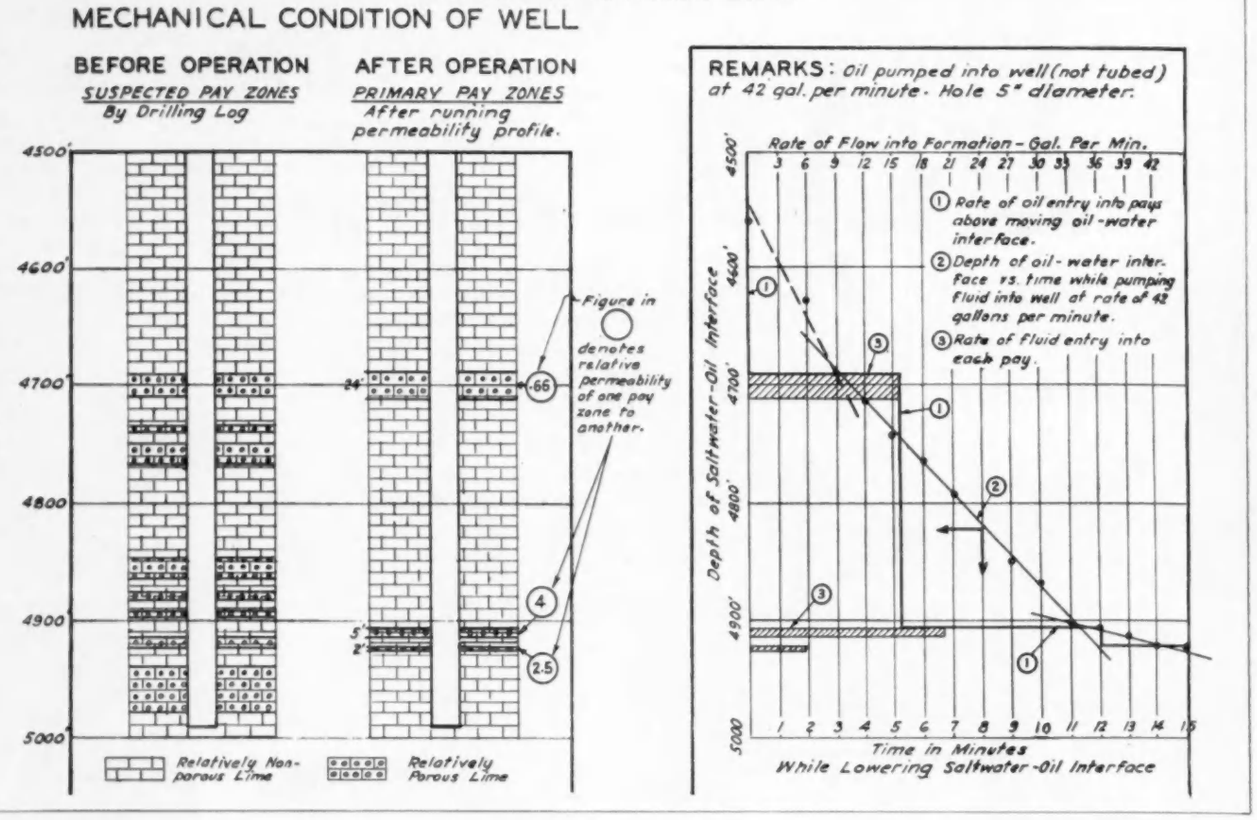
CASE No. 8

Determining Permeability Profile by Locating and Measuring the Rate of Descent of an Oil-Water Interface in Open Hole (not tubed), While it Is Forced to Pass Down Through Section Containing Porous and Permeable Zones


MECHANICAL CONDITION OF WELL
BEFORE OPERATION
SUSPECTED PAY ZONES
By Drilling Log
AFTER OPERATION
PRIMARY PAY ZONES
After running permeability profile.
4500'
4600'
4700'
4800'
4900'
5000'
24'
66
5'
2'
4
2.5
Figure in ○ denotes relative permeability of one pay zone to another.
Relatively Non-porous Lime
Relatively Porous Lime
REMARKS: Oil pumped into well (not tubed) at 42 gal. per minute. Hole 5" diameter.
Rate of Flow into Formation - Gal. Per Min.
3 6 9 12 15 18 21 24 27 30 33 36 39 42
① Rate of oil entry into pays above moving oil-water interface.
② Depth of oil-water interface vs. time while pumping fluid into well at rate of 42 gallons per minute.
③ Rate of fluid entry into each pay.
Depth of Saltwater-Oil Interface
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time in Minutes While Lowering Saltwater-Oil Interface

ability profile can be obtained (not essential when using tubing method), and in order to accomplish successful operations of some types, it may be absolutely essential to know the well diameter. Case No. 9 is in reality a composite of caliper surveys on six different types of wells. Although it is not implied that all wells may be significantly irregular in diameter, conditions do often lead to such irregularities.

Once the permeability profile has been determined, the mechanical method for selectively injecting the acid can be designed. A variety of processes are possible from which one can be selected to fit almost any set of conditions. Selection of packer spots by caliper survey, if necessary, followed by use of packers is one proven method of assuring that the acid is confined to the tight zone or zones. The use of temporary permeability seals with or without an "Electric Pilot" in conjunction with variable fluid pumping rates in the tubing and the annular space offers a method of controlling acid injection under a variety of conditions. Cases Nos. 6 and 7, already discussed, and 10, 11, and 12 illustrate technique and results of controlling acid injection selectively to meet the requirements of the permeability profile.

Both Cases Nos. 6 and 7 illustrate the need for, and one method of, selectively injecting acid in an over-all section which had been previously acidized.

Case No. 10 is an excellent illustration of the need for selectively acidizing the relatively tight zones. This particular workover also illustrates the detrimental effect of excess water originating in relatively permeable zones on oil located in relatively tight zones. There may be a lot of application for work of this nature where the entire oil producing section has considerable variation in permeability.

There have been developed acidizing techniques which depend upon permeability seals alone for selectively directing acid into tighter zones. Although this process unquestionably increases the efficiency of acidizing, it has lacked the positive control required for best results.

It should be worth while to review a recent innovation in acid treatment technique in a chalk formation in North Louisiana. The reservoir is unique in that the producing chalk section is some 150 feet thick and averages 25 percent porosity with an average permeability of less than one millidarcy. The history of production from this section indicates that wells will not be commercial producers unless the well cuts some fracture planes or planes of structural weakness. Fracture planes contain relatively little volume but offer a tremendous area for seepage drainage from adjacent highly porous, but very tight, chalk. Initial acid treatments have proven very successful, but reacidizing jobs have generally been discouraging. The reason suspected was that acid on the second or third treatments spent itself in fracture planes previously opened.

It was decided to compress gas, inject it into the well and build the pressure up in the reservoir surrounding the well bore to its initial pressure of some 500 p.s.i. The gas naturally filled all open channels, feeder channels and adjacent drained chalk. The acid treatment followed immediately and, because of the gas cushion in the channels already formed, at least a great part of the acid would penetrate and widen less exposed fractures or zones of structural weakness. Case No. 11 illustrates pertinent conditions concerning this job. At this time, it cannot be definitely stated in just what manner the gas cushion made the treatment such an atounding success. It is believed that the forcing of acid into previously unopened channels is a primary

UNIVERSAL RECOGNITION

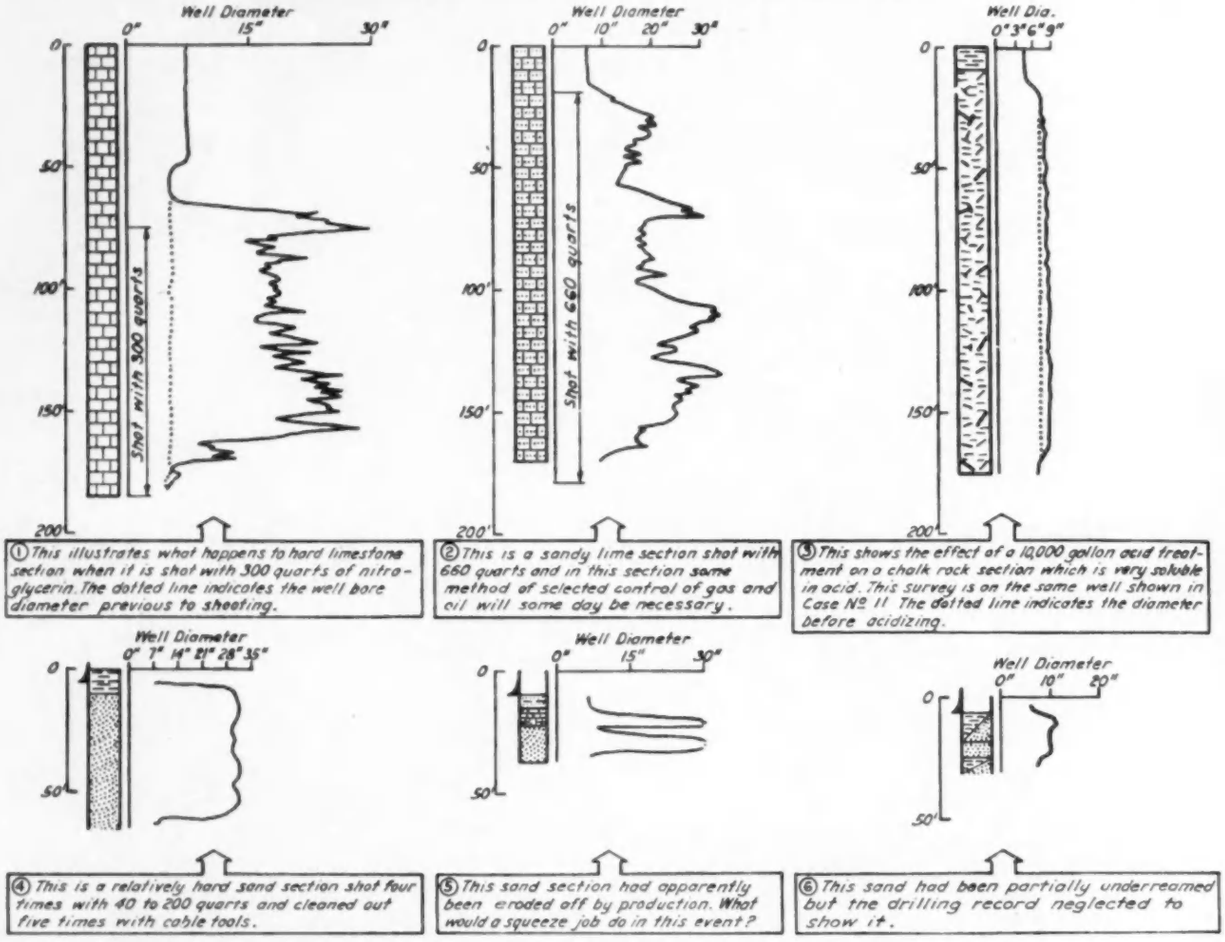
The TESCO hallmark has gained worldwide recognition as the safety signal on oil industry drilling and producing equipment . . . our specialty for more than a decade until war came to America. Thanks to our rich experience in pouring steel to match the gruelling requirements of the oil fields, the TESCO Foundry could, and did, quickly tune up for war. Through expansion we are still serving our chosen field . . . oil . . . and, by the same token of helpful experience, we will be even better able to build for this industry when victory is won.

TEXAS ELECTRIC STEEL CASTING CO.

HOUSTON, TEXAS

CASE No. 9

Some Instances Where a Caliper Survey May Completely Alter Reconditioning Technique



① This illustrates what happens to hard limestone section when it is shot with 300 quarts of nitroglycerin. The dotted line indicates the well bore diameter previous to shooting.

② This is a sandy lime section shot with 660 quarts and in this section some method of selected control of gas and oil will some day be necessary.

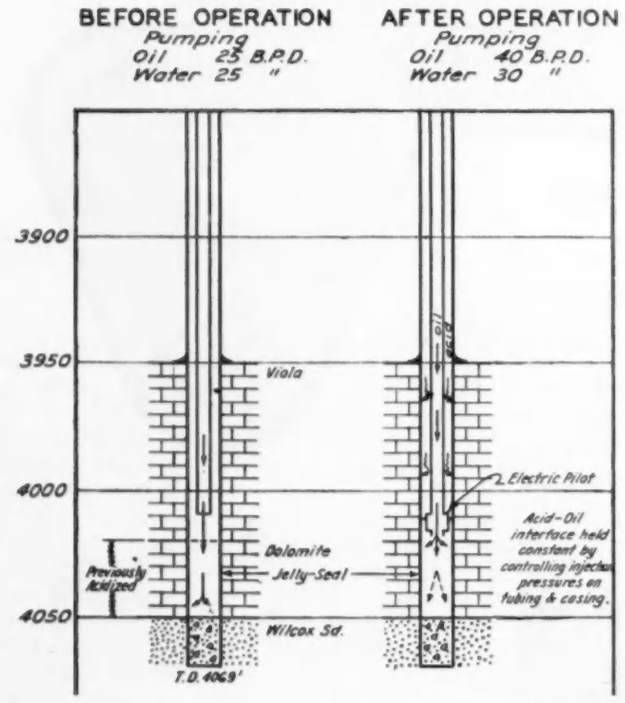
③ This shows the effect of a 10,000 gallon acid treatment on a chalk rock section which is very soluble in acid. This survey is on the same well shown in Case No. 11 The dotted line indicates the diameter before acidizing.

④ This is a relatively hard sand section shot four times with 40 to 200 quarts and cleaned out five times with cable tools.

⑤ This sand section had apparently been eroded off by production. What would a squeeze job do in this event?

⑥ This sand had been partially underreamed but the drilling record neglected to show it.

MECHANICAL CONDITION OF WELL



CASE No. 10

Acid Treatment of Upper Less-Permeable Zone With Lower More-Permeable Zone Open. Also Illustrates the Value of Selectively Producing Tight Zones Previously Exposed When Very Permeable, Active Water Drive Reservoirs Are Being Produced

FORMATION:

Viola Limestone; effective thickness—5'; porosity, 15 percent; permeability, very low until acidized.

COMPLETED:

July, 1934. Potential 729 barrels, natural. Casing set near top of Viola; pay zones in Viola and Dolomite but main pay zone in Wilcox.

PRODUCTION TESTS:

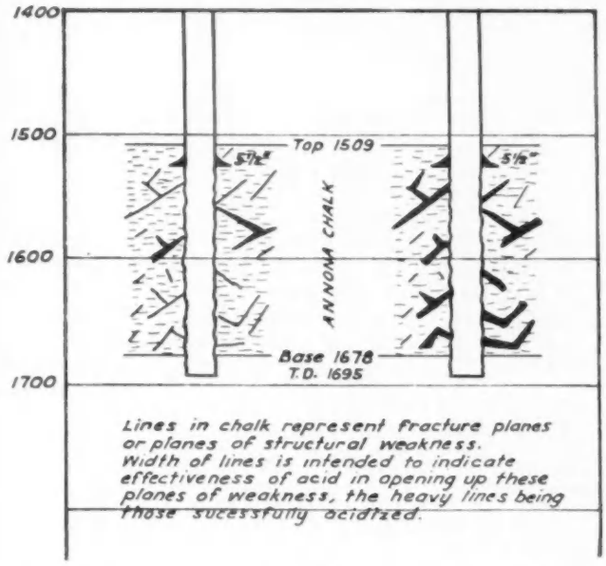
	Oil	Water
Before Plugging Wilcox and Before Acidization	Trace	400 B.P.D.
After Acidizing Dolomite	25 B.P.D.	25 B.P.D.
After Acidizing Viola	40 B.P.D.	30 B.P.D.

In this well the Wilcox first was plugged off by plugging back with cement, then the Dolomite was given a conventional acid treatment. When an attempt was made to treat the Viola using a jelly seal to temporarily plug-off the Dolomite, the seal either did not set up or flowed back into the Dolomite formation. The acid placement was then controlled by pumping it down the annular space while oil was pumped in through the tubing; the pilot indicated the acid-oil interface to be at the base of the Viola.

Subsequent tests showed treatment a success.

CASE No. 11

Use of Gas Under Pressure Ahead of Acid to Prevent Acid Selectively Entering the Existing Well-Defined Drainage Channels Established by Previous Acid Treatment


1400
1500
1600
1700
Top 1509
5½"
5½"
ANNONA CHALK
Base 1678
T.D. 1695
Lines in chalk represent fracture planes or planes of structural weakness. Width of lines is intended to indicate effectiveness of acid in opening up these planes of weakness, the heavy lines being those sucessfully acidized.

FORMATION:
Annona chalk; effective thickness 150 feet; porosity 25 percent; permeability < 1Md.
Completed September 21, 1941, for 236 barrels in 17½ hours, flowing, after two-stage acidizing with 1000 and 4000 gallons.

PRODUCTION TESTS:
10-41, 36 barrels daily, 9 barrels water; 12-41, 7 barrels in 4 hours, 1.4 barrels water; 3-42, 5 barrels in 4½ hours, 3.5 barrels water; 6-42, 11.3 barrels in 5 hours, 8 barrels water.

WORKOVER:
8-30-42 1000 MCF gas injected over 18-day period, maximum input pressure 410 pounds, gauge. 9-17-42 acid treatment, 10,000 gallons of 15 percent acid pumped in with 5.5 MCF gas. Flushed with 151 barrels of oil and 2.05 MCF gas at 380 pounds, gauge. Opened well after 2 hours; flowed strongly through 2—2-inch flow lines first few hours, then died after 12 hours; continued to flow by heads for 3 days. Recovered 600 barrels of new oil in 14 days. At end of this time tested 34 barrels daily with 10 barrels water, pumping. Test before workover 10 barrels daily. After 15 weeks production is averaging 32 barrels daily and should settle at approximately this rate for several years.

benefit, however, the gas cushion ahead of the acid surely aided in cleaning out the spent acid and load oil.

To further solve the chalk-rock problem, it was reasoned that horizontal holes drilled outward from the existing well might aid in allowing the acid to reach uncontacted channels which could not be reached by treatment from the normal well. Case No. 12 is included to show the history of this experiment. It is noted that the same type of gas cushion was used as in the other well, and the results were also unusual.

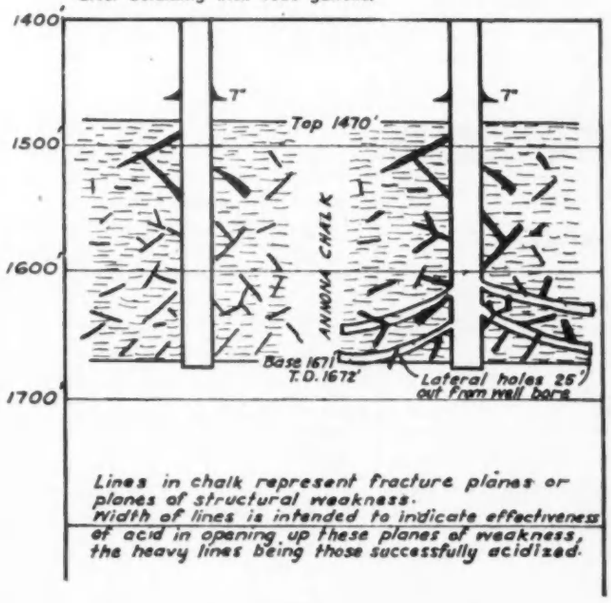
It is not possible at this stage of this experimentation to determine just how far off from vertical these "lateral" holes deviate, but it is known that they went 25 feet in some direction.

It is recognized that the technique developed for chalk-rock is probably limited to that very type of formation. It is presented to show how the mechanics of operations can be designed to accomplish a specified objective regardless of difference in reservoir conditions from one area to another.

CASE No. 12

Use of Lateral Drilling to Extend the Effective Area of Acid Penetration and Thus Extend the Drainage Area of the Well

FORMATION:
Annona chalk; effective thickness 150 feet; porosity 25 percent; permeability < 1Md.
Completed 10-10-36 for 40 barrels daily, pumping, after acidizing with 1000 gallons.


1400'
1500'
1600'
1700'
7"
7"
Top 1470'
ANNONA CHALK
Base 1671'
T.D. 1672'
Lateral holes 25' out from well bore
Lines in chalk represent fracture planes or planes of structural weakness. Width of lines is intended to indicate effectiveness of acid in opening up these planes of weakness, the heavy lines being those successfully acidized.

PRODUCTION TESTS:
12-1-36, 5 barrels daily; 10-41, 5.3 barrels daily, 0.9 barrels water; 5-42, 3.31 barrels daily.

WORKOVER:
10-17-42. 7 lateral holes drilled; 5¼-inch x 25-foot hole at 1610 feet; 5¼-inch x 25-foot hole at 1612 feet; 5¼-inch x 25-foot hole at 1612 feet; 5¼-inch x 17.5-foot hole at 1628 feet; 5¼-inch x 7½-foot hole at 1628 feet; 5¼-inch x 25-foot hole at 1630 feet, and 5¼-inch x 25-foot hole at 1628 feet.
Tested 10-11-42, pumped 2 barrels oil and mudded up. 10-12-42, pumped 72 barrels circulating oil (108 barrels used).
10-13-42 pumped 10 barrels circulating oil, 1 barrel water.
10-14-42 pumped 8 barrels circulating oil, 1 barrel water.
Tested 14 days—leveled off to 4½ barrels daily.
11-13-42 gas acidization performed. Well had previously taken 82 MCF with pressure building up to 550 psi, ultimately took gas at rate of 3.2 MCF per hour of 750 psi.
Total gas injected 210.4 MCF; maximum pressure 750 psi.
Acidized with 8000 gallons acid.
Recovered load oil plus 580 barrels in 1 week.
End of 3 weeks averaging 85 barrels daily, 6 barrels water. After 5 weeks averaging 34 barrels daily, 5 barrels water.
Will probably settle to average of 20 barrels daily oil and produce substantially at that rate for several years.

At Last

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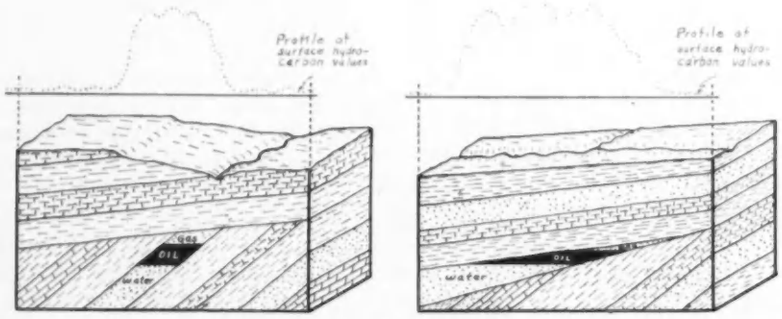
In Stratigraphic Traps or Unconformity Accumulations there are no physical anomalies for the Geophysical Method to work on, but regardless of structure oil deposits can be found by Geochemical Analysis.

Stratigraphic Trap and Unconformity Accumulation type fields include some of the largest. ONE THIRD of all the oil discovered since Drake's discovery well have been of this type. A FEW of these fields are: East Texas, Goose Creek, Yates, Oklahoma City, Bradford, Pa., and Clinton Pools, Ohio.

Try our Low Cost and Rapid Geochemical Analysis on your next Wildcat Block.



Sketches showing two of the many conditions which can cause Stratigraphic Traps or Unconformity Accumulations

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Discovery Thinking

[*Continued from page 17*]

regions, indications are that they will be discovered with additional drilling but at this time we can only guess at their extent and nature.

Typical of the better known areas where several layers of geology have been discovered are the four areas shown in Figures 14 to 17, inclusive.

In each instance, each layer is separated from the other by an unconformity; each layer of geology is completely independent of other layers above and below; there is no clue in the upper layer of either the existence or the characer of the next layer below; and each layer has its own oil and gas geology, completely independent from each of the other layers.

It is in this last characteristic that we particularly find application to future discoveries of petroleum, for it means that no sedimentary area can be considered as explored until many test wells have been drilled through all the layers of geology down to the basement rocks. As a matter of fact, every sedimentary region in the United States has unknown and unexplored geology waiting to be drilled. It is probable that there is a volume of undiscovered and therefore unknown and unexplored geology equal to that which is already explored and it is inconceivable that these undiscovered layers will not some day be translated into equally large volumes of oil and gas. The infinite complexity and at the same time the infinite opportunity in the petroleum geology of any locality becomes apparent when we remember that each layer has its own wedge belts of porosity, its own facies and lithologic changes, its own structural history, and its own oil and gas geology.

This concept as a part of ones thinking, immediately gives hope and promise to countless square miles of territory which are at present condemned because of their monotonously uniform and uninteresting structure and stratigraphy when considered from the viewpoint of orthodox petroleum geology. As in a layer cake where the sweetest layer may be deep in the cake, so with these layers of geology, the richest layer at any locality may be the second, or third or fifth layer from the top, with no indication of its presence until the drill has crossed the overlying unconformity.

[1] Harold L. Ickes, Petroleum Administrator for War, and Paul V. McNutt, chairman, War Manpower Commission, Chicago Journal of Commerce, Feb. 10, 1943, p. 13.

[2] Wallace E. Pratt, "Geology in the Petroleum Industry," Bull. Amer. Assoc. Petrol. Geol., Vol. 24, pp. 1209-1213 (July, 1940).

(To be continued in an early issue)

TERROR FROM THE SKIES

On many fronts our air-borne invaders are striking terror in the hearts of our enemies. For war today is three-dimensional, and mountains, deserts, seas and fortifications offer no obstacles to U. S. Paratroops.

Transporting armies through the air is a big job—a job that calls for big planes and big engines. Today, engines of 2,000 horsepower are commonplace. Already on testing blocks, in manufacturing departments and on drawing boards, in engine plants throughout the country, is the promise of engines that will dwarf even these giants.

And transmitting the power from these engines are gears of such light weight—of such extreme precision, metallurgically and dimensionally, that engineers marvel that they could be produced by mass production methods.

How the problems that were presented in their design and manufacture were overcome is a military secret. But the mounting figures of our aircraft production is proof that here at Foote Bros. these precision gears are rolling off production lines in an amazing volume.

When the war is won, these same gears give promise of revolutionary advantages in the design of machinery—advantages that will mean "better power transmission through better gears."

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard
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To assist Paratroops in recognizing arms, ammunition and supplies instantly, colored parachutes are used. Pictured here are men and equipment descending upon a foreign airfield.

FOOTE BROS.

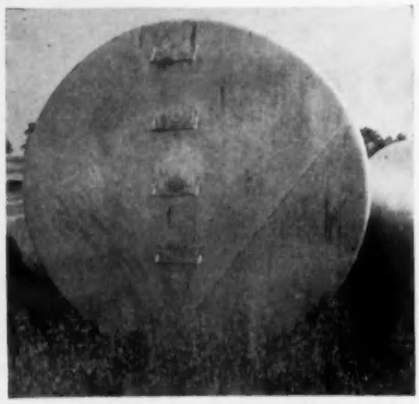
Better Power Transmission Through Better Gears

PRACTICAL OPERATING *Hints* FOR THE DRILLING RIG

$5.00 will be paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, *Houston.*

1. FUEL STORAGE

Built-in Steps for Butane Tank Access



Welded loops on rear head of unit simplify climbing to elevated valves and safeties.

ACCESS to the top of the drilling rig butane tank is simplified by one driller through the use of steps welded to the back end of the big container.

The steps are formed from ⅝-inch sucker rod, made wide enough to give proper footing, and with offset sufficient to permit the weight to be carried on the ball of the foot when climbing to the top of the tank.

By placing these steps at the rear of the tank, they are protected from breakage or damage while the tank is being shifted between wells, and the front of the container is left free except for the necessary connections and valves.

2. MANIFOLDS

Unitized Distribution Betters Boiler Feed

UNITIZING the leads from feed-water control and header without individual by-pass on each line is attained by one drilling contractor by mounting the stub ends of feed-water mains on a skid, the main valve tying each branch to the header and permitting full flow for quick filling of any boiler.

Normal make-up water is supplied through an automatic control unit, water being supplied by it passing through a second header supported above the stub mains. Each branch from this small distributor main is provided with throttling globe valve, permitting accurate regulation of the percentage of total make-up water to each boiler.

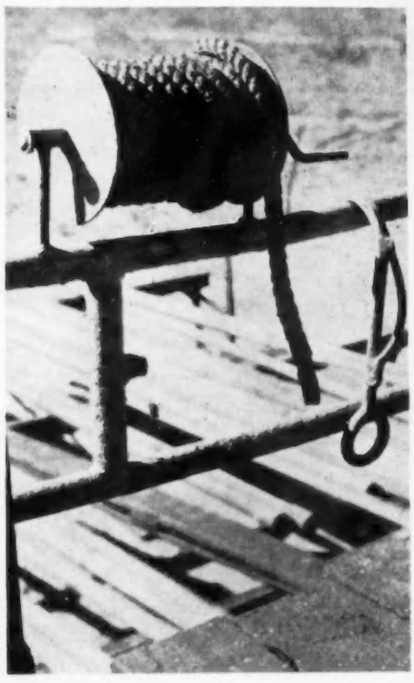
Since manual regulation of percent of total water is provided, it is possible for the fireman to make necessary adjustments to compensate for inside units in the battery, and to maintain uniform water level throughout the entire setting.

The stub ends of the branches are welded to short supports, themselves integral parts of the skid assembly, and relative positions of all lines are thus assured, making for marked time-saving when rigging up at a new location.

Standardized nipples and unions provide quick assembly of boiler-feed lines, while streamlined by-pass units provide normal make-up water through automatic regulator action.

3. CORDAGE CARE

Reel Provides Space For Catline Storage



Permanently attached to upper rail, this device provides quick readying of rope.

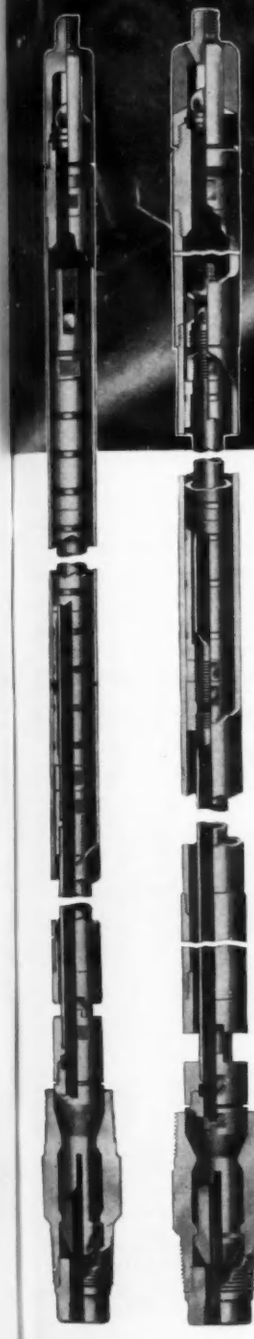
PROTECTION for the spinning line, during the periods when not actually in use on the floor, is afforded by a reel set up on the railing, out of the way of work, yet readily available when pipe is to be run into the hole.

The reel itself is 15 inches in length, with the spool ends of light plate, 12 inches in diameter. The two uprights are of pipe, with the bearing elements short pipe nipples of the proper size to accommodate the sucker-rod shaft on which the drum is fabricated.

The unit is assembled by the welder,

New Manufacturing Method holds pump barrels to 1/1,000" tolerance

Flupaco has gone to great lengths to manufacture pump barrels of close tolerances. An exclusive heat-treating process eliminates distortions and misalignments. Specially designed straightening machines produce precision-aligned barrels that won't bind the plunger, even in crooked holes. And hand straightening provides the final touch of perfection.



FLUPACO "Groove Seal" Volume Producer

FLUPACO Improved Insert Pump

Intensive metallurgical research and never before attempted techniques of manufacture have produced one-piece hardened and honed Flupaco pump barrels which are even straighter than untreated barrels.

By designing special furnaces to handle long tubing lengths . . . developing automatic controls that provide better methods of quenching, straightening, honing and finishing . . . and carburizing with liquid heat, Flupaco has been able to eliminate the uncontrollable distortions and fixed misalignments common to many methods of heat-treating tubes.

This exclusive carburizing method eliminates subjecting any single part of the tube to differences in heat . . . completely controls depth of hardness on both inner and outer surfaces . . . removes danger of hardening through the tube wall, thereby preventing the brittleness common to cast liner assemblies . . . insures uniform hardening of tubes from top to bottom, inside and out, to any controlled depth.

Since the super-hard, one-piece barrels used in Flupaco "Improved Insert" and "Groove Seal" Pumps outwear many other pumps two to five times, it would seem only logical that such fine equipment would command premium prices. But Flupaco Pumps equipped with these barrels are available at prices corresponding to common multiple cast liner barrel types. Investigate today!

The unprecedented hardness measurements of Flupaco hardened and honed barrels (shown in the accompanying chart) account for the outstanding performance records of Flupaco Pumps.

	BRINELL	*ROCKWELL*
FLUPACO HARDENED AND HONED PUMPS	**627**	**64 to 70-C**
UNTREATED STEEL PUMPS	**150 to 170**	**6 to 14-C**

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with washers to limit end play and prevent the spool edges from dragging against the supports. When made, the supports are welded to the top pipe of the railing, mounting the unit permanently at this spot, and enabling it to be transported between wells as a portion of the railing.

A six-inch throw in the crank at the end of the shaft provides ample leverage for spooling the line rapidly, without leaving any projecting part to form a hazard to men working at the reel.

4. MUD CONTROL

Adjustable Choke for Maintaining Pressures

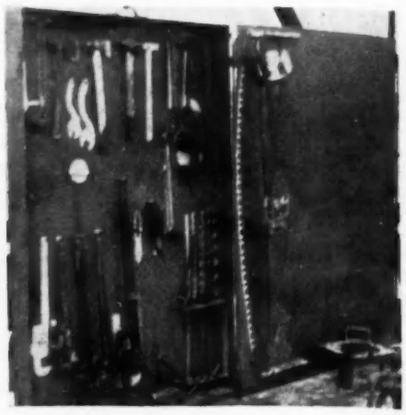
FREQUENT surging of the mud-line pressures results in the functioning of the relief valve, with time out for the consequent replacement of the device or resetting of the lever. One drilling contractor maintains the desired mud pressures without imposing this frequent service on the relief installation by tying into his flow line a flow-bean of the type used for producing wells.

The bean is set to the desired pressure on the mud column in the hole, and to bleed off excess material to the pit. By varying the opening within the bean, any desired proportion of the stream may be bypassed without the wear and frequent replacement of valve parts which would be required were usual types of mud-control units used.

The bean, relieving the stream of mud after screening and settling, holds its shape well and does not require frequent replacement, many beans giving longer life when controlling mud pressures than when employed in their normal place on a production set-up.

5. TOOL PROTECTION

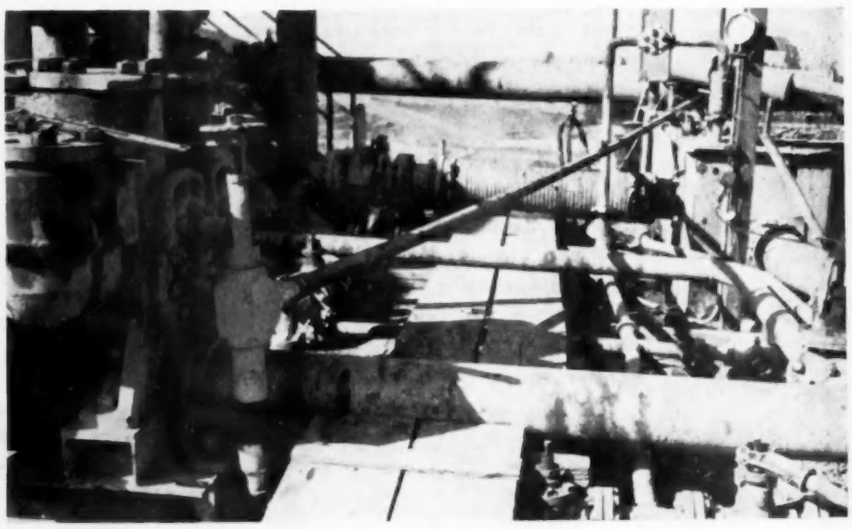
Hinged Case Displays Units for Quick Use



Built to stand wide open, this unit closes to protect contents while on the move.

SEPARATING the tool-carrying unit from the parts-storage box, which latter frequently is just excess freight when the tools are required on a work-over, one drilling company fabricates a flat steel box, of two shallow trays, fitted with hangers to accommodate the usual run of saws, hammers, wrenches and other hand tools.

This case, lying flat when closed, is hinged to open out wide, being equipped with a welded eye which permits a light line being carried to derrick girt as support. By setting such a unit on a pair of blocks or short timber before supporting with the short line, the cover is left free to be closed on such occasions as coming out of the hole, and tools thus are protected from being damaged by mud and water.



Cut into mud discharge line, this flow-bean may be set to maintain any desired back-pressure on mud column in hole, with quick closing permitting full volume when required.

☆ ☆ ☆ ☆ WASHINGTON ROUNDUP ☆ ☆ ☆ ☆

Critical Problems of Industry Studied by PIWC

Satisfactory Development of Rubber Program Continues

Order No. 11 Will Be Changed to Permit Secondary Recovery

By B. F. LINZ
Washington Correspondent

☆ ☆ ☆ ☆

AN INCREASINGLY critical refinery situation east of the Rockies was brought out during the week at the April meeting of PIWC, which recommended an immediate study to devise means of getting refinery operations back in balance.

The refinery situation was one of a number of matters touched upon by the council, whose committee on petroleum economics criticized the refusal of Army and Navy officials to make known their prospective requirements so that the industry could plan to meet them. The lack of information, it was pointed out, makes impossible any forecast of supply or recommendation as to rationing.

An interesting development of the meeting was the disclosure that Uncle Sam is poor pay, owing Eastern oil companies alone more than $200,000,000 which they would like to collect.

The rubber situation also came to the fore again during the week, with Director William M. Jeffers denying reports he would retire, predicting that the full present synthetic program would be completed this year.

In the PAW mill is a supplement to PAO 11 which will permit the use of material for secondary-recovery operations—by either water, gas or air drive—which were under way on March 30. Under the basis order, unlike M-68 which it replaced, no automatic authority for the use of materials for such operations is granted. The supplemental order will give operators about three months to secure clearance for the use of materials for secondary-recovery operations which will run beyond next June 30.

West Texas-Oklahoma Line Studied by OPA

Stanolind Pipe Line Company's proposal for a 16-inch pipe line from West Texas to Oklahoma (THE OIL WEEKLY, April 5) is under study by PAW, but no decision will be made until current surveys of the District 2 situation have been completed and the 1944-45 crude oil requirements of Mid-West refineries clarified, it was disclosed by Administrator Harold L. Ickes April 9.

Construction of the line was urged in a resolution by PIWC.

The proposed line would call for approximately 383 miles of new pipe, requiring not less than 42,645 tons of steel and costing approximately $7,000,000, which would be raised privately, it was said by Deputy Administrator Davies, who also pointed out that the construction of the 20-inch products line between Houston-Beaumont and the Eastern Seaboard necessarily has first call on steel and other critical materials available for expansion of oil transportation at this time.

B. P. Sibole, president of Stanolind Pipe Line Company, said that for its needs the company desired to start construction at the end of this year, but work could be started sooner if the project is approved in Washington and material made available. Because of the drop in elevation, only an initial pump station would be required to operate the minimum capacity of 54,000 barrels daily, and only seven intermediate stations would be required for the maximum flow of 116,000 barrels.

If built the line would connect with the following pipe line systems near Drumright and Cushing: Stanolind; Texas; Texas-Empire; Shell; Empire; Gulf; Sinclair; Oklahoma-Ajax; Magnolia; Standish; Mid-Continent; Tidewater; Continental and Champlin.

Rubber-Supply Situation "Definitely Improved"

Reported so satisfied with the progress of the synthetic rubber program that he was preparing to resign in July to return to his railroad, Rubber Director William M. Jeffers has denied that he intends to quit but the impression continues to prevail that the rubber problem has been "licked."

Jeffers was represented as believing that the time was not far distant when it might be possible to remove some of the curbs on rubber consumption, primarily with respect to tires, although the restrictions on gasoline are a major factor in automobile use and their elimination will be based on oil-supply factors in a large part of the country.

The director's denial of reports he would resign was seen as largely aimed at counteracting any impression the Army and Navy might get that the rubber program was progressing better than had been anticipated and renew their campaign to get for other purposes the critical materials which Jeffers has had earmarked for rubber-production plants.

There was no denial that the situation has improved, and in most quarters the belief was expressed that, while there may be a modified "valley of death" late this year as predicted by Jeffers, the country thereafter will be "over the hump" so far as rubber is concerned.

The synthetic rubber now being developed will be equal to natural rubber, but will cost more, a House appropriations subcommittee was told by Dr. Lyman J. Briggs, director of the National Bureau of Standards, during hearings on the Department of Commerce supply bill for the coming fiscal year.

Briggs indicated, however, that the present differential of about 15 cents a pound between the costs of natural and synthetic rubber will mean a revived market for the former after the war, although he admitted the probability that the manufacturers will be able to lessen that margin considerably.

Products made from Buna S resemble those made from natural rubber so closely that the average user would notice little difference in appearance or serviceability, he said. At the request of Rubber Reserve Company and the rubber director, the bureau is engaged in the setting up of standards for synthetic rubber.

PIWC Digs Into Drilling, Manpower And Postwar Problems at Recent Meeting

Steps to provide quickly the materials necessary for drilling, manpower and postwar problems, pipe lines, production and the Eastern supply situation were among the questions canvassed at the April meeting of PIWC last week.

A feature of the meeting was a "show" staged by W. Alton Jones, president of War Emergency Pipelines, Inc., who exhibited motion pictures of the big-inch and entertained members of the council, government officials and members of Congress at a lunch April 6.

Alton reported to the council that construction of the first leg of the big-inch was accomplished at some 30 percent less cost than originally estimated. Actual expenditures will run about $25,000,000, saving $10,000,00 to the government, which is financing the line.

A national crude requirement of at least 4,270,000 barrels daily in the first quarter of 1944—and that figure the minimum based on the assumption that conditions in Districts 1, 2 and 3 will be balanced, full advantage will be taken of Atlantic export availability and military requirements will not exceed those which now can be anticipated — was

foreseen by the committee on petroleum economics in its monthly report.

District 1 receipts and production of crude and products will run 1,437,000 barrels daily during the current quarter and thereafter should exceed 1,600,000 barrels daily, which will be considerably above the estimated rationed demand based on present restrictions, the committee reported.

Throughout its report, however, the committee complained that refusal of military authorities to make available information on anticipated requirements renders impossible any proper planning of supplies, and warned that the industry should not be held responsible if, because of this lack, it fails properly to gauge military demand.

High spots of the April report were:

1. Increases above present estimates of the District 5 production committee may be required in California if government agencies demand their full estimated requirements.

2. The 20-inch products line should be operated from Indiana east on alternate pumping stations as soon as the line itself is completed.

3. On the basis of steel, horsepower and labor the proposed Florida barge canal is more expensive than pipe lines and cannot be justified.

4. Runs in Districts 1, 2 and 3 will be in excess of rationed demand in Districts 2 and 3 and available transportation to District 1 and must be adjusted.

5. With a shortage of available crude apparently "inevitable" in District 2 by early 1944, a pipe line should be constructed from West Texas to Northern Oklahoma to safeguard supplies.

Completion of added transportation facilities to District 1 will substantially increase supplies for that area and, if rationed domestic requirements are held constant, there will be increasing amounts available for military requirements despite the fact that the East Coast has passed through a critical situation this winter and stocks are at critically low levels, the council was told.

The principal reasons for the more than anticipated decline in stocks in March, the committee explained, were relaxation of the ban on pleasure driving and anticipation of lower coupon values which evidently led the public to cash most of the coupons up to March 22, neutralizing much of the saving made during February; the restoration of heating coupon values (held justified by the committee) and the necessity for consumers to use coupons as soon as possible after they became valid, and the failure of tank-car deliveries to reach anticipated levels.

"The unexpectedly low stock situation necessitated rather drastic action to prevent exhaustion of gasoline stocks at many points immediately after March 22, but it is felt that this situation can be improved by relaxing restrictions on gasoline shipments into the district as heating oil demands drop off during April," the report commented.

With supplies to the district exceeding more than 1,600,000 barrels daily, and that in spite of practically no tankers being available, more oil than required for the estimated annual rationed demand based on present restrictions and even more than that demand during the winter's peak will be provided, it said.

It was strongly recommended that the subcommittee's report be brought to the attention of the proper authorities for decision as to the volume of exports really needed and the distribution of this anticipated volume of supplies between products, "so that the industry may be in a position to adjust its operations to whatever rationing base is deemed necessary in order to be in a position to make adequate provision for the products required for export."

District 1 receipts of total crude and products during the next 12 months, by methods of transportation, were estimated in the report, as follows:

(Thousands of Barrels Daily)

	1943 2nd Q	3rd Q	4th Q	1st Q 1944
Rail*	928	824	879	882
Pipe Lines	211	520	492	469
Water-borne†	221	219	221	178
Total Receipts	1,360	1,563	1,592	1,529
Add Local Production	77	74	73	72
Total New Supply	1,437	1,637	1,665	1,601

*Includes effect of pipe-line projects carrying oil part way for final transshipment by tank car, and movements in drums in second quarter.

†Ocean tankers, lake tankers, and barges.

These estimates, it was explained, assume completion of the big-inch pipe line to the coast by July 1, and the first leg of the 20-inch line by September 1, the line to operate at half capacity in September and start at full capacity October 1. To the extent that these dates are not realized, it was stated, the indicated supplies to District 1 will be lessened.

In view of WPB's approval of immediate completion of the 20-inch line, the pipe-line engineering subcommittee recommends that the materials be programmed in such manner that it will be possible to operate the line with alternate stations as soon as it is laid, and to install sufficient valves so the remaining stations can be cut in without serious interruption as soon as materials are available.

The line completed to the coast with alternate stations is estimated to have a delivery capacity of 166,000 barrels daily, or 56,000 barrels more than if completed only to Norris City, and if the project is carried through some 50,000 to 100,000 barrels may be added to the estimates of deliveries to District 1 for the first quarter of 1944.

"In the projection," it was explained, "the committee has assumed that available transportation facilities would be so utilized as to supply products in the proper proportions required. This will necessitate the use of the Plantation and the Helena pipe lines on kerosine and distillate during part of next winter, despite the reduction in capacity that this would entail. The lines are assumed to operate on gasoline during the summer, and in the case of the Helena line, it is expected that the greater part of the volume so moved will be transshipped by tank car to District 1. This will necessitate an exception from the present prohibition against such tank car shipment."

Discussing the situation in other parts of the country, the committee pointed out that on the West Coast supplies available for government requirements (largely military) are determined mainly by crude producing capacity, and that past takings by government agencies have been substantially under their estimates. Recent estimates of such requirements are not available, it was said, but if the full requirements under the old estimates are taken in the future, increases in production would be required above the present estimates of the district production committee of the district's current ability to produce on an efficient basis.

Although District 5 has substantial reserves of product stocks meeting federal specification requirements, the problem of adequate crude supplies is an important one, now under study by the proper district production agencies, and it is expected that such study will include estimates of the critical material requirements for increasing California crude output.

Adjustments in refinery runs and yields to secure a balanced program in Districts 1, 2 and 3 were discussed at length by the committee, which found that refinery operations in Districts 4 and 5 are substantially in balance and can reasonbly be expected to be so maintained.

Runs included in the program of Districts 1, 2 and 3 are those recommended by the respective refining committees of those districts, and are made up of the sum of the estimated minimum runs for war product plants, plus runs at non-war plants deemed essential to conserve transportion, the council was told.

These runs are in excess, by approximately 105,000 barrels daily over the period, of the possible runs in the three districts, as limited by local rationed demand in 2 and 3 and by available transportation to 1, and the excess during the current quarter will run to 160,000 barrels daily.

The problem of adjusting these overall runs to avoid this excess involves, in the case of war plants, the extent to which runs can be reduced by modifying process procedure and exchanging products between plants, and in the case of both war and non-war plants, transportation considerations in relation to local demand.

"Since this problem involves all three districts, a joint cooperative study covering specific plant operations is necessary for its solution by representatives from each district of the proper agencies involved with prompt action by PAW to allocate crude runs to stills on the basis of the facts developed," it was held.

In its summary, the report said:

"The committee wishes to point out that without information on military requirements the industry is unable to prepare effectively to meet its war obligations. Sudden, unexpected demands, such as those of last November and December are bound to be disruptive and might make it impossible to live up to the industry goal of supplying whatever our military forces need when and where they want it. The committee recommends that the data prepared by the subcommittee as to the availability of military supplies be reviewed by the proper authorities and adequate advance notice be given so that proper provision can be made sufficiently ahead of time to meet such military requirements.

"The refinery runs recommended for Districts 1, 2 and 3 by the district re-

fining committees represent an unbalanced condition in comparison with possible runs, as limited by local demand and available transportation, and this lack of balance will interfere increasingly with the efficient meeting of the industry's war requirements. It is recommended that cooperative study be made by the proper refining and transportation committees of the three districts with prompt action by PAW to allocate crude runs to stills on the basis of the facts developed. Pending solution of this problem, it is recommended that PAW allocate available overland transportation in such a way as to avoid loss in efficiency of tanker transportation and to protect the output of essential war products, even at the sacrifice of overland transporta-

"Estimates of national totals for the year commencing April 1, 1943, are developed for a comparison with historical data on demand, crude production and refinery runs and stocks. These estimates of national totals are predicated upon the assumption that the above lack of balance will be corrected and that full advantage will be taken of the supplies indicated as being available for export or other use on the Atlantic Seaboard. On this basis, the estimated average crude oil requirements for the U. S. for the year 1943 is 3,990,000 barrels daily compared with 3,950,000 barrels daily during 1942. For the first quarter of 1944 it is estimated at 4,270,000 barrels daily, compared with 3,830,000 barrels daily for the first quarter of 1943. Increased military requirements could be taken from the Gulf or Pacific Coast, but this would obviously increase the production levels indicated."

A number of resolutions were adopted at the final session April 8, including one recommending establishment of mill stocks and field depots of oil-country tubular goods.

The resolution pointed out that drillers are experiencing long delays in shipments of pipe after WPB approval of purchases and no longer have any inventories of their own on which to draw, and WPB was asked to authorize establishment of stocks both at the mills and at points in the field near production centers, the stocks to be subject to control by PAW.

The council also recommended to the Petroleum Administration that technical advisors be appointed for each district production committee, to help solve district problems of an engineering or technical nature, and as a group to discuss and correlate national problems with the council's committee on production.

The production committee's report, submitted to the council with an accompanying report of the division of production of the Petroleum Administration, reviewed drilling operations in all five petroleum districts for the first two months of 1943, and discussed a number of production problems. These included secondary recovery, the appointment of technical advisors, a report of a study of the problem of obtaining sucker rods, WPB Limitation Order L-211 freezing pipe manufacture, the establishment of tubular goods stocks, the manpower problem, and the use of insignia for oil industry workers.

Meeting briefly with PIWC, Administrator Ickes disclosed that he had reached a decision on the question of an increase in the ceiling price for crude oil, but did not make known what action he had taken.

In Congressional circles, however, there was some discussion of a 50-cent increase, which may have been wishful thinking or the result of informal advices from "downtown" sources.

One very important matter to come before the meeting was that of the government's indebtedness to oil companies on the East Coast, estimated at more than $200,000,000, for products purchased by the government, unreimbursed compensable war-compelled extra transportation charges, sums due but withheld representing 25 percent of tanker charter hire, and 25 percent of partially-reimbursed claims for extra transportation costs.

Many of the smaller companies have been forced to borrow money to finance the carriage of these government obligations, it was declared, and a progressive accumulation of these burdens may impair the ability of the companies to aid in the war effort.

Pointing out that the government insists upon prompt payment of money due it, including settlement for revenue accruing from earmarked increases in ceiling prices on oil products, the council held it should be equally prompt in the discharge of its obligations and adopted a resolution requesting the aid of PAW in working out remedial measures.

First efforts of the new subcommittee created to study oil industry post-war problems will be to develop the necessary factual information on which to base surveys, it was agreed. The work will be carried on from offices opened in Cleveland, under the direction of Paul Ryan, chairman.

In a brief report, the subcommittee announced its plan to consult with groups comprehensively representing various branches of the industry concerned as their studies on any of the important post-war problems progress, and asked to be informed of any prospective discussions by trade associations and other industry groups who plan discussions of post-war problems. Personnel of the subcommittee has not yet been entirely settled, it was reported.

East Saved 50 Million Barrels of Fuel In 6 Months; Next Winter Still Problem

Fuel-oil rationing and conversions in the Eastern area saved some 50,000,000 barrels of fuel oil during the half-year from October 1 to March 31, it is estimated by OPA.

Normal demand in those six months, OPA officials said, would have been approximately 115,500,000 barrels and for the full year beginning last October 1 would have been about 138,000,000 barrels. Approximately 38,000,000 barrels was cut off under the original rationing procedure, and another 4,200,000 barrels were saved by the 10 percent cut in coupon values for the third and fourth heating periods, while conversions saved another 8,000,000 barrels.

OPA rationers, paying tribute to the cooperation of the public in accepting lower temperatures, declared that "it can be fairly stated that fuel-oil rationing during the past winter accomplished its major objectives.

"Despite the critical nature of the oil shortage, the civilian population received its minimum requirements and not a single plant producing essential war materials was seriously hindered by a lack of oil."

The cut in coupon values in the early months of the year were necessitated by an exceptionally critical situation in January and February, when "a reduction of as little as 25,000 barrels a day in supplies of heating oil in the area would have meant severe suffering approaching actual catastrophe in many of the large population centers of the Atlantic Seaboard."

"Even sharper cuts in householder use of heating oil would have been necessary if the heating allotments of non-residential buildings, such as office buildings, and theatres had not been slashed an additional 25 percent, reducing consumption of fuel oil by these users to 50 percent of normal," it was stated. The savings effected by this action were estimated at approximately 1,500,000 barrels for the two months.

Next Winter

OPA had no comment upon possibilities for next winter, other than a promise that some of the vexations would be eliminated from rationing, but Administrator Ickes, in a letter to Chairman J. Buell Snyder of the House appropriations subcommittee before which George A. Wilson had predicted a possibility that rationing would be unnecessary, continued to maintain that the situation next winter might be even more serious than during the 1942-43 season.

"It is most unfortunate that any such statement should be made because it has not foundation in the supply facts as they are before us at this time and is definitely not a position with which PAW can take in advance of knowing more than can now be known as to the days ahead," Ickes said. "On the contrary, with stocks on the Atlantic Seaboard badly depleted, with off-shore military requirements continuing to increase for obvious reasons, with the greater demand of a war industry operating at full speed, and with such unsettled questions as whether we are to have the material with which to build the additional pipe line planned, there can be no solid basis for assurance that a continuation of restrictions upon consumption will not be necessary."

(Construction of the 24-inch line to the East Coast was approved by WPB after Ickes wrote his letter.)

"Next winter," the administrator said, "is six months off and many things can happen in six months to change radical-

[*Continued on page 46*]

Scientists Seriously Consider Improving Oil Finding

Geologists, Geophysicists and Paleontologists fear dearth of discoveries may mean failure to meet growing oil demand

FORESEEING that the current low rate of finding oil may within a year result in a productive capacity that will be inadequate to meet growing consumption, the men who search for new oil fields last week gave serious, collective consideration to the problem of improving exploratory results in the United States. This was done at the annual meetings of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists and the Society of Economic Paleontologists and Mineralogists, held in Fort Worth.

Almost without exception papers presented on the programs discussed the need for finding more fields, suggested means by which the discovery rates might be improved, and raised the question of the shortage of men and materials. The situation was regarded as critical by most speakers, and it was urged that more cooperative effort be devoted to the problem of advancing prospecting methods. The manpower question was another factor considered exceptionally acute, frequently causing fear to be expressed that needed expansion of activities is unlikely to be realized.

Discovery Thinking

If the industry is to discover the quantities of oil that will be necessary to supply enlarged future consumption, it is necessary that it begin thinking in terms of "big" geology so that we may be assured of "big" results, declared A. I. Levorsen, head of the A.A.P.G. Research Committee. We think "almost exclusively in terms of individual oil fields, when we should be thinking in terms of oil provinces; in discoveries of millions of barrels, when we should be thinking in terms of billions of barrels; and in acres of new production when we should be thinking in square miles."

Levorsen then went into a discussion of the possibilities of wedge belts of porosity and layers of geology, to show that we have reason "to believe there are still vast volumes of rocks in which geological conditions are known to exist which reasonably may be expected eventually to become translated into equally large petroleum reserves. . . . The question of the failing rate of discovery is then not yet to be answered by saying it is due to a lack of oil to be discovered. Obviously something is seriously wrong with prospecting methods."

There is need, he said, for creative thinking in place of routine geology, with opportunity and encouragement provided for developing new ideas. With this thought in mind, Levorsen raised such questions as: Is our economy framework properly tuned when bigger pay jobs are in administrative and production duties? Is our operating framework good when 90 percent of a geological department's time is spent in routine, development and administrative duties, instead of searching for new fields? Does it make sense for industry to continue to look for structural traps when a big majority of past discoveries have been stratigraphic accumulations? Are new exploration tools generally designed to catch the eye of the executive rather than the elusive oil field?

Levorsen suggested that the correction of these conditions might easily result in an improved discovery efficiency and also urged that research on "many of the fundamental problems of discovering new supplies can not start too soon. An industry spending a quarter of a billion dollars annually on exploration can afford to set aside a small percentage of this money in an attempt to make their effort more effective."

Need New Instruments

Although material shortage, manpower shortage and inadequate crude oil prices have influenced the declining discovery rate, more potent contributing factors have been the failure for nearly a decade to develop any radically new or improved finding techniques and the industry's insistence on exploring the same old provinces, asserted L. F. McCollum, vice president of Standard Oil Company of New Jersey, in an address entitled "Factors Influencing Declining Oil Discovery Rates."

After discussing the industry's declining discovery picture from several angles, McCollum concludes that better implements and new fields to use them in are needed, in addition to adequate prices, materials and manpower, if ample crude-oil reserves are to be maintained. A major portion of this responsibility, he said, rests upon the geological and geophysical profession, and urged that they seek to devise new methods and move into new areas. He based this conclusion on studies of past performances that (1) indicated discovery rates could not have been maintained without the opening of new prospecting territory, and (2) that without the introduction of new finding methods, total discoveries would have been much smaller.

These studies, continued McCollum, show that "our finding tools are less effective today than at any time heretofore from the standpoint of the volume of oil being found, and further illustrate the extreme need for developing new prospective territory in the Mid-Continent-Rocky Mountain-Gulf Coast region if the discovery rate is to be maintained. These two factors have profoundly influenced the discovery rate over the past three to seven years, and, in my judgment, have been major causes of its decline.

Big Task Ahead

The industry is challenged as never before to find, develop and produce more oil, William B. Heroy, director of reserves for Petroleum Administration for War, told the geologists.

The job of finding oil takes about 25,000 people. Some 10,000 are engaged in the application of geology and geophysics—about 5500 in geology and 4500 in geophysics, including not only technical people but their staffs, he said.

"Those of you who have the supervision and management of technical staffs must, in the face of the increasing demands of the service for recruits, take the responsibility of holding these staffs together. You must school yourselves in the methods of presenting to the representatives of Selective Service the essential character of your work and of the services of your employes," Heroy said.

"Most of your technical employes can only render effective service after years of training and more years of special experience. In most cases it is now impossible to train anyone in their places. Many of you are seeking, without success, to employ others with similar qualifications. Surely, if you cannot find others, you need no clearer proof that those now employed are irreplaceable," he said.

The petroleum administrator is vitally concerned that essential manpower should remain available to the industry, Heroy said, "and there is no function of the industry that causes greater concern than the development of new oil supplies. You may be assured of our desire to help not only in general but in specific ways. To this end the following plans are being put into execution:

"1. Occupations in the exploration branch of the industry are being redefined so as to indicate more precisely their functions and the need for such services.

"2. Detailed evidence will be presented to the War Manpower Commission as to the need for technical personnel, supporting a request that appropriate administrative units be set up to review individual cases on appeal.

"3. A program of information and education is under way to assist employers of technical and skilled person-

nel in keeping them in essential jobs and to aid them in the solution of their deferment problems.

"4. Detailed information concerning personnel in the exploration branch of the industry is urgently needed to support our representations to the War Manpower Commission. General statements carry little weight. We have asked the National Service Committee of this Association to aid us in obtaining this information and I trust that you will answer their inquiries as promptly and fully as you can."

Heroy said the nation's capacity to produce is being tested as never before, and that the reserves are being called into action.

Reviewing the oil industry's present position, Heroy said that proven reserves stand at the highest level in history, although there is every indication that increases in proven reserves reported for several years past have come, to an increasing extent, from the extension of fields previously found and from the reappraisal of the reserves of previous known fields.

Go to Work

"Go to work" with tenacity, guts and imagination, was the plea of E. DeGolyer, whose resignation as assistant deputy petroleum administrator was announced from the platform.

DeGolyer said that it appeared the United States could increase its daily production from 400,000 to 500,000 barrels over its current rate. The capacity to produce this additional oil lies in the Gulf Coast, Southwest Texas and especially West Texas, and unfortunately, he continued, these regions are handicapped by transportation troubles. This is particularly true of West Texas, and he added that the oil produced in this area also was sour and therefore not as desirable from the war viewpoint as others. However, he predicted that it was going to be necessary to correct the transportation problem of this region and also to change refinery designs so they could operate on this sour crude oil.

Wildcatting for War Needs

The association presented a symposium that focussed the attention of the industry on those areas which give most promise to the wildcatter searching for new oil fields which would at the same time be the most valuable to the war needs. Each speaker was chairman of a committee which studied the problem in four large territories covering practically all the United States. They were asked to consider the problem with the following factors in mind: (1) war markets, which included transportation facilities and quality or type of crude likely to be found; (2) depth and cost; and (3) chances of finding successful wildcat producers, including the probable size of the resulting discoveries. The procedure for rating consisted of giving a maximum of 10 points for each of the 3 factors, which were graded downward according to the relative rating of the territory under consideration. Thus, an ideal area with adequate transportation, producing a good quality of oil, at shallow depth and low cost, and which had good chances of finding additional sizeable fields could get a possible rating of 30. On the other hand, where transportation was inadequate, or the oil of a poor war product type, or the chances of finding additional fields unfavorable, a territory received only a portion of this possible top rating. Unfortunately, some of the committees did not thoroughly consider all the factors. The difference in opinion of the various committees also made it impossible to compare the four reports, but it was possible to compare regions within a district.

NEW OFFICER ELECTED BY A.A.P.G.

New officers elected at the twenty-sixth annual meeting of the American Association of Petroleum Geologists are, left to right, A. R. Denison, Amerada Petroleum Corporation, Tulsa, president; R. W. Clark, Western Gulf Oil Corporation, Los Angeles, vice president; R. E. Rettger, Sun Oil Company, Dallas, secretary-treasurer; Carey Croneis, University of Chicago, Chicago, editor.

Southern District

Because of its proximity to the terminus of the 24-inch pipe line to the Atlantic Seaboard and its yielding of oils of a generally desirable character, the Northeast Texas region was given the highest rating of those included in the Southern United States area, which committee was headed by O. L. Brace, consulting geologist of Houston. The Northeast Texas area was given a rating of 20 points.

"It is true," the report stated, "that none of these crudes is particularly attractive from an octane or toluene standpoint, but they are desirable for lube stock and for heating purposes. This district also is one of the main asphalt producers of the country."

The territory consequently was given a rating of 12 from the war products standpoint. Because the region also yields fields which usually represent large discoveries, Northeast Texas was given a rating of 7 points on this factor.

The next highest rated area in the Southern area was North Louisiana and South Arkansas with a rating of 19 points, followed by Central and North Texas with a rating of 18 points. "These two districts," the report explained, "derive considerable transportation advantage from the new 24-inch line and are also well situated to major lines running north and northeast into the Mid-Continent and Chicago areas. North Louisiana and South Arkansas also has a slight transportation advantage from a tank-car standpoint. Each of these two areas produce crudes that have about an equal desirability. In addition, the chances for successful wildcatting are somewhat similar, although it is probable that exploration in North and Central Texas will result in more new discoveries for a given amount of wildcatting, but these discoveries will represent smaller reserve units than are to be anticipated in North Louisiana and South Arkansas."

The Texas Gulf Coast and Southwest Texas areas were given an equal total rating of 17 points. "Southwest Texas has a considerable disadvantage from the standpoint of transportation, but it has the advantage in depth." The Gulf Coast region was given a higher rating from the standpoint of quality of crudes and consequently from the standpoint of war markets. Southwest Texas had a total rating of 8 while the Texas Gulf Coast had 12. "Each of the two areas," continued the report of Brace, "is regarded as holding about the same potentiality for new discovery with the discoveries running somewhat higher in number in Southwest Texas, but lower in importance." The regions were rated equal in these two respects, while on depth the Coastal territory was given only 6 points compared with Southwest Texas' 8 points.

The Louisiana Coast and West Texas were given an equal totaling rating of 16 points. "In this case the more favorable war market rating of the Louisiana Coast over West Texas is balanced by shallower drilling and the considerably more favorable chances of successful wildcatting in West Texas. As a matter of fact, were it not for the war market complications, West Texas would have a general rating as high or higher than any district in the region."

The area lying east of the Mississippi River along the Gulf Coast was given

a rating of 13. This was due largely to the poor chances of successful wildcatting.

Western Oklahoma is believed to hold great promise of future production because of its thickness of favorable sediments and the occurrence of oil and gas almost entirely around the rim of the basin, but the drilling will be deep and the distance from trunk pipe lines is considerable, J. V. Howell, consulting geologist of Tulsa, reported in a summary on oil-discovery prospects in the North Mid-Continent and Eastern areas.

Despite this favorable production possibility, the west portion of Oklahoma is given a low rating however, because all trunk lines through which oil from the area can now be moved to the war market are filled to capacity.

Taking up definite areas and discussing their prospects, Howell reported that "the eastern interior basin of Illinois is given a rating of 8 for its chances of successful wildcatting. Abundant subsurface data are available for the interior basin, and these data are being studied and used by the geological departments of oil companies and by the geological surveys of Illinois, Indiana, and Kentucky."

Michigan was given a rating of 8 points in respect to its chances for successful wildcatting. Insofar as availability of information is concerned, Michigan can probably be rated as high as any other area in the country, Howell said.

Northern Indiana was given a rating of 2 points for its wildcatting success. Formations younger than the Trenton in the area are too poorly developed, or if present, too shallow to be of much importance.

The Northwestern Ohio area was given a rating of 4 for its chances. Every county in the area has had at least several tests to the Upper Trenton pay, leaving large untested blocks which have possibilities, even though previous wildcats have not been very encouraging.

In the Appalachian area, the chances of finding small additional reserves of gas and/or oil are excellent when one considers the lensing sand conditions now known, but the possibility of adding much to the country's oil or gas production are practically nil. The prospects of finding deeper oil reserves below 3000 feet cannot rate over 7 points, Howell reported.

Rates of discovery in Kansas are declining, and it is not expected that discoveries will continue at such a favorable rate as in past years, the report pointed out; nevertheless, it is expected that wildcatting in the state will continue at a steady pace due to several favorable features: (1) information is readily available between companies; (2) lease rentals and bonus payments are generally low; (3) with two exceptions, all Kansas companies are willing to support wildcatting; and (4) the success of the Kansas independent operator in developing new production has in turn made him more and more willing to take on the hazards of wildcatting. Kansas was given a rating of 9 on chances for successful wildcatting.

Howell reported that wildcat drilling in the Panhandle has been disappointing. Accumulation may occur in anticlinal folds giving separate closures, in truncated porous beds below an unconformity, or in stratigraphic traps on the northeast flank of the buried mountains.

On the basis of known structures and probable gas reserves the eastern portion of Oklahoma was given a rating of 9 points, but only for its potential gas possibilities.

Thirteen areas in the Rocky Mountain region have been designed as possible sources of oil, and the two parts that will be closely examined by oil prospectors seeking to further the war effort are the Sweetgrass Arch district in Montana, and the Western Wyoming district, the Rocky Mountain Association of Petroleum Geologists reported in the symposium on favorable areas for wildcatting.

"The unconformity between the Ellis formation (Upper Jurassic) and the Madison limestone (lower Mississippian) is a most important factor in finding new oil fields in the Sweetgrass Arch district, for erosion of the Madison during the time interval of the unconformity is a major factor controlling accumulation in some fields on the arch—principally Kevin-Sunburst," the association reported. "Next in significance is the disconformity between the basal sandy zone of the Kootenai formation (Lower Cretaceous) and the top of the Ellis."

The association reported that other areas in the Sweetgrass Arch district that could well be further examined for oil are (1) those on the western limp of the arch, where the feathering out of the Kootenai sands may have developed other stratigraphic traps, such as the Cut Bank field, and (2) those east and southeast of the arch, where similar traps may be found in post-Madison and pre-Ellis formations that are not present on the arch.

"As most of the promising structures in the Big Horn and Wind River Basins of western Wyoming have been drilled to the Tensleep (Pennsylvanian), it seems that the chances of finding more production there depend largely upon deeper testing of the Tensleep and subjacent Amsden (Pennsylvanian) and Madison (lower Mississippian) in proved and in inadequately tested structures.

"There is a chance," the report said, "that light oil may be found in tertiary continental beds in and near the central parts of the Big Horn, Wind River, the Green River Basins, where drilling depths could be the maximum possible."

California

The California committee report, read by Max L. Krueger, Union Oil Company, put San Joaquin Valley at the top of the list in that state, followed by Los Angeles Basin, Ventura-Santa Barbara coastal area and then Santa Maria district.

It was pointed out that there was no area where new reserves could be put to better use than in the Los Angeles Basin. This was because this basin has adequate pipe lines, refining facilities and yields the type of crude most needed for the war, in California, which is the heavy grades with high fuel-oil content. The need for fuel oil on the West Coast caused the committee to give this type of crude a slightly higher rating than even those yielding high-octane gasoline.

Price Increase Plea

"If excessive abandonments are to be avoided and new discoveries are to be stimulated, price increases appear desirable if not absolutely necessary," declared Richard J. Gonzalez, Humble Oil & Refining Company, who discussed wartime changes in the petroleum industry. He showed the influence of war on the industry's drilling, production, transportation and refining operations, besides discussing reserves, prices and other factors.

"Present ceiling prices are based on differentials for quality and geographic location which existed in 1941. Since that time," continued Gonzalez, "there has been a sharp increase in demand for crudes suited to the production of critical war products and a decrease in demand of crudes producing large quantities of low-octane gasoline. Furthermore, there has been a major shift in transportation, which entirely disrupts existing differentials for geographical location."

The advance in prices of "crude petroleum and products since the outbreak of war in 1939 has been considerably less than for other commodities," Gonzalez said.

He was critical of the recent Tariff Commission study of costs, which prompted OPA to declare that a general advance in crude prices is not justified. In this connection, Gonzalez pointed out that the commission report was questionable because (1) the comparison of prices and costs with 1939 as a base period is unsatisfactory due to the year being an abnormally poor one of the industry, with the lowest level of crude prices since the depression of 10 years ago: (2) the report gave no consideration whatever to a return on invested capital; (3) neither was consideration given to the increased cost of finding oil, which has at least doubled or tripled in the last few years, as the amount spent searching for oil has remained constant or increased, while new discoveries have declined 25 to 50 percent of normal; (4) the study admittedly failed to secure information from many smaller operators whose costs probably are the highest in the industry.

Stripper Wells

The only way to prevent premature abandonment of stripper wells and save the millions of barrels of oil underlying them is to use the tried and proven methods, which is a price sufficient to make their operation profitable, C. P. McGaha, president of the National Stripper Well Association, said.

McGaha pointed out the importance of the stripper well, stating that they produced approximately 15 percent of the country's 1942 oil production and represented a reserve of 4 billion barrels, or approximately one fifth of all known reserves.

When the operation of a well becomes unprofitable there is no further incentive on the part of the owner to produce any more oil from it, although there may be plenty left in the ground, continued McGaha. "Under our present system of controlled economy and artificial price ceilings these abandonments are increasing at an alarming rate, having grown from an average of 8355 abandoned well per year from the years 1935 to 1940 to 11,733 in 1941 and an estimated 12,000 in 1942." It is apparent from this that there has been a marked increase in abandonments since the crude price cut in 1938, in fact, the abandonments in 1941 and 1942 are

more than 50 percent greater than in 1938."

"The loss of reserves due to these premature abandonments presents a problem worthy of the most serious consideration on the part of those in government having to do with our oil supplies. The recoverable reserves underlying abandoned wells during the past 8 years amounted to more than 220,000,000 barrels."

A series of four papers was devoted to the various phases of secondary recovery. It was asserted that wider adoption of secondary-recovery programs is essential to the war effort and should be encouraged. This it was declared could provide large quantities with little financial risk when applied with improved secondary-recovery criteria and technique. Again, it was held that due to the expense involved in these operations that the encouraging greater application of secondary-recovery programs, which could increase the nation's recoverable oil by some 4 billion barrels.

Rough Road Ahead

"Since we are accepting the situation as critical in regard to the necessity for the discovery of new petroleum reserves, then it is not only the patriotic duty of, but a challenge to, our limited number of geologists and geophysicists to do everything in their power to bring all their resourcefulness into this most important program," declared Fritz L. Aurin, president of the American Association of Petroleum Geologists.

"Since so many of our detail and key personnel are not available, the work they have been doing has been added to the duties of those now having the responsibilities of carrying on. These details may have placed such a heavy burden on the geologist that it is a handicap to the direction and the work of exploring for oil," Aurin continued.

"Tools and methods alone cannot accomplish the ultimate in successful exploration for reserves. There is still something often lacking in the mental make-up of the exploration geologists. You may call it imagination, ingenuity, resourcefulness, or geological philosophy. In the early days, the geologist did not always have complete information on which to base a recommendation, but being resourceful and having an open mind, he had no fetters or shackles on his imagination or line of reasoning and would make recommendations which today would be considered unorthodox by some.

"Regardless of the excellent work of the petroleum geologists and the geophysicists," declared Aurin, "it can still be buried and accomplish nothing as far as satisfactory results are concerned unless there is co-operation between them and the management. In the case of the independent geologists, they are dependent on receiving the same cooperation from the company geologists and managements," he said.

"There is still another suggestion that seems to offer possibilities in our assistance to the program of discovery of new reserves. Most of the industries have unlocked their hoarded caches of secret information on patents and all other things that they have guarded very zealously. The petroleum industry has done likewise in practically all phases of its activities, but there is still room for an all-out participation in a few other phases.

"You are not being urged to reveal all of your information on districts and states, or even on local areas except to interested parties having lease ownership," Aurin stated. "All of you know that there are many prospects where lease ownership is diversified to such an extent that no one company or individual would be justified in exploring without assistance. It is in these localized known prospects that the exploration efforts need to be stimulated and the geologists and geophysicists can do more than anyone else in this respect, if permitted to pool or communitize all their information and if such pooling of information is restricted to the benefit of the participants.

"If all such information were pooled and thoroughly discussed by the interested geologists and geophysicists and recommendations made to their respective companies, there is a greater probability that the managements would be favorably interested in following through with unitization and prospecting. Then, again, with as complete information as possible, better discovery locations can be made and thus the average ratio of discovery wells to total number of wildcat wells drilled could be reduced.

"We are firm in our belief that we have the tools, methods, and many other requirements necessary to carry out this program, provided complete cooperation is given and no further serious inroads are made in the necessary manpower and personnel. Even then the road will be rough and rocky and all of us will be required to use every resource at our command."

Maintaining Geophysical Work

The task to locate 4500 wildcats so judiciously that neither steel nor manpower will be wasted in unjustified drilling places a huge responsibility upon the prospecting industry, declared F. Goldstone, president of the Society of Exploration Geophysicists. To do this the exploration program must be planned carefully. "Geophysics offers the best means, in most areas, of reducing structural uncertainties and so should figure prominently in the program." To meet the present emergency, Goldstone suggested four general procedures:

1. Existing techniques should be applied with even greater microscopic precision in the already well explored territories. Continual improvement in seismic methods has resulted in the ability to map accurately the smallest geological features which offer promise of being commercial structural type accumulations. So much effort has been directed along this line that an increased number of discoveries are being made but the size of each individual field is small. However, the method has virtue of offering predictable results.

2. We must take our proven methods of structural mapping to new territories as yet inadequately explored. In these operations we must take the chance of finding that sediments are present. This might be totally unsuccessful, but at least in this approach we would be playing for high stakes.

3. We must match our technical abilities against the unsolved problems of the geophysically "tough" areas where extensive wildcatting only awaits adequate structural guidance. Such areas have been largely avoided because others offered greater ease of mapping.

4. We must look to new methods to revitalize exploration. The history of geophysical exploration is a succession of surges in activity as new methods or techniques found favor, and each surge initiated a new bulge in the discovery rates. "In my opinion," Goldstone said, "there is no prospect of a powerful new method being brought to immediate commercial success, and I am convinced the present emergency must be met with the conventional tools already familiar to us, correctly applied, however, in the proper places."

If it is to maintain its high contribution, the geophysical branch must continue its operations at near all-time high levels. The shortage of manpower and materials makes it doubtful that this can be done, continued the speaker. "We are now down to the first-string team with virtually no reserves, and further losses of technical men will inevitably mean the shutting down of field crews. The seriousness of the situation cannot be exaggerated since a complete shutdown of seismograph exploration could be brought about by the removal of some 500 men. The position as regards semi-skilled workers is even worse. Statistics which cover over 80 percent of geophysical operations in 1942 disclose that with a total payroll of 4370, the 1428 men went into the services and 1974 into other industries. During the same period, 3252 replacements were hired, presenting a turnover of 75 percent.

"We must assemble the facts which govern our ability to support our part of the war effort and bring these facts home to those who control the over-all effort," Goldstone said.

"Bacteria and allied microorganisms may play an important role in the formation and accumulation of petroleum. They may even provide a clue to the detection of present subterranean deposits," asserted Claude E. Zobell, of Scripps Institution of Oceanography, University of California.

"Although there is no experimental evidence to indicate that bacteria can convert organic matter into crude oil, bacterial activity may promote the process in various ways. Likewise the activities of other kinds of bacteria may prevent the accumulation of petroleum hydrocarbons in certain environments," Zobell continued, in explaining the work done to date in one of the American Petroleum Institute research projects. Because bacteria multiply so rapidly and are so active physiologically they may be responsible for chemical reactions of considerable magnitude. Significant numbers of living bacteria have been found in recent marine sediments, some at depths exceeding three miles and in core depths as great as 17 feet. Evidence has been found that they can be active within wide ranges of temperature, hydrostatic pressure or salinity.

After outlining some of the chemical reactions that may be influenced by bacteria, Zobell said that the influence of bacteria activity upon the formation of petroleum and especially upon environmental conditions must not be disregarded and expressed the hope that "complete information may provide further clues to the discovery of oil deposits."

Geological Trends

One of the "most encouraging develments within recent years is the trend

toward cooperative studies on regional geology and on the fundamentals of petroleum geology," F. M. Van Tuyl said in an address that reviewed new developments in geology and geophysics during 1942. The manuscript, prepared by members of the faculty of Colorado School of Mines, was based on the literature.

"There is greater interest of individual geologists in supplying data of value in connection with the effort to solve basic problems, the report said. "There is greater concentration of effort in connection with the refinement of technique for the examination of sediments and for the development of criteria for location and development of stratigraphic traps. There is a tendency towards the restudy and reinterpretation of well samples, which have long been available, and of all known geologic data in an effort to decipher paleogeographic and paleogeologic condition and paleogeologic conditions which might be of value in scientific exploration. More attention is also being given to core analysis in connection with the effort to increase the recovery of oil and to better estimates of oil reserves. On the whole there is much more interest in research petroleum geology than ever before."

An encouraging development of recent years is the increased interest in the fundamental problems incident to the origin of oil and gas, fluid mechanics and the efficient production of oil, which the American Petroleum Institute is sponsoring, it was said. The effort of the Research Committee of the American Associaion of Petroleum Geologists to stimulate research and compile data on basis problems in petroleum geology also has met with considerable success.

Few important improvements in standard geophysical procedures were mentioned in the study, which stated this was regretable "Because our present methods are approaching the diminishing-returns phase of their cycle of existence."

Factors Need Recognition

The significance of various factors which militate against an expansion of the wildcatting program must somehow be driven home in the minds of those who control them and who can correct them, for otherwise it is doubtful whether enough wildcats will be drilled in 1943 even to approach the 4500 urgently recommended by the Petroleum Administration for War, declared Frederic H. Lahee in his annual statistical study of wildcat results (see page 57, THE OIL WEEKLY, April 5, 1943).

Lahee pointed out that there has been a marked drop in the rate of discovery through the years 1937 to 1942, and this is in spite of a steadily increasing footage drilling in wildcats and, except in 1942, an increasing number of wildcats drilled per year. He showed that "From 109.4 barrels of new reserves discovered per foot of wildcat drilled in 1937 there has been a drop to only 21.7 barrels per foot of wildcat drilled in 1942."

The principal reason for this decline, he continued, "lies in the fact that new geological traps for oil are becoming increasingly difficult to find (1) because they are fewer, (2) because they are deeper, (3) because they are associated with less pronounced geological structures, and (4) because low-permeability sands formerly overlooked, now are being exploited. Based on experience to date we may say that, to step up the rate of discovering new reserves, an increasing number of wildcats must be drilled each year, and the holes drilled must be carried to greater depths than formerly, wherever the deeper stratigraphic section holds any promise whatever. If we are to maintain a satisfactory discovery rate, as applied to new reserves, we must become more vigorous than heretofore in our wildcatting campaign."

Lahee said there were several reasons why wildcatting declined in 1942 when it should have been increased. "First, as is almost universally recognized by the oil fraternity, the price for crude was too low to encourage taking the obvious increased risks of wildcatting. Second was the reduction in skilled labor for drilling. Third there was the doubt as to whether, if oil were discovered, enough pipe and other necessary equipment would be available to take care of the ensuing offset requirements and continuous-drilling requirements of the lease contract. Fourth, there was the question, in many areas, whether oil, if found, could be transported. These factors have served to weaken the exploration effort as applied to wildcat drilling. And there are other factors which will still further impede the wildcatting program unless they are corrected in time. Such, for instance, are (1) the continuing reduction of technical staffs composed of those who are indispensable in the several phases of exploration for oil; (2) the deterioration of drill pipe and other equipment used in drilling, and the consequent twist-offs and breakage, especially in deep holes; and (3) concern as to the continuation of the oil man's percentage depletion allowance which serves as an incentive for wildcatting."

Harlan Johnson New Paleontologist Head

J. Harlan Johnson, Colorado School of Mines, was elected president of the Society of Economic Paleontologists and Mineralogists. The election took place at the annual meeting of the group. Dr. Johnson succeeds H. L. Driver, Standard Oil Company of California, Los Angeles.

R. Dana Russell of San Diego, on leave from the University of Louisiana, was elected vice president. H. B. Stenzel, University of Texas, was reelected secretary-treasurer. J. Marvin Weller, Urbana, Illinois, was reelected editor of Journal of Paleontology, and W. H. Twenhofel, Madison, Wisconsin, was reelected editor of the Journal of Sedimentary Petrology.

R. D. Wyckoff Heads Geophysical Society

R. D. Wyckoff, Gulf Research & Development Corporation, Pittsburgh, was elected president of the Society of Exploration Geophysicists at the annual meeting held last week in Fort Worth. He succeeds Frank Goldstone, Shell Oil Company, Houston.

William Rust, Jr., Humble Oil & Refining Company, Houston, is the new vice president of the society. Hart Brown, Brown Geophysical Company, Houston, was elected secretary-treasurer. The society's editor, J. A. Sharpe, was renamed.

All-Out Cooperation of Oil Industry To Help Win War Theme of API Meet

Application of oil and gas to the war effort and post-war effects on the industry were paramount at the annual meeting of the Eastern District, Division of Production, API, April 8-9, Pittsburgh.

Timely coverage on materials, manpower, government talks were woven around the theme: "All Out Cooperation to Win the War."

New District Officers for 1943-44 are: Chairman, W. E. Ferguson, Ohio Fuel Gas Co., Columbus; Vice Chairman: R. B. Anderson, Columbian Carbon Co., Charleston; R. J. Sullivan, Carter Oil Co., Mattoon, Ill.; V. F. Bowyer, Peoples Natural Gas Co., Pittsburgh; J. V. Goodman, Equitable Gas Co., Pittsburgh; G. C. Irby, Turner Petroleum Co., Michigan; S. M. Vockel, Dun-Mar Oil Co., Pittsburgh; Sec.-Treas., J. N. Schaefe, East Ohio Gas Co., Cleveland.

Advisory committee includes O. W. Vanpetten, J. C. Askam, A. H. Bell, F. A. Benkert, S. J. Brendel, F. M. Brewster, Forest M. Dorn, F. E. Eckert, M. G. Gulley

T. W. Hartman, K. C. Heald, Marshall R. Joy, D. S. Keenan, R. B. Kelly, W. C. Kneale, H. J. Lowe, Alex U. McCandless, W. L. McCloy, J. G. Montgomery, Jr., J. H. Newlon, E. V. O'Rurke, Christy Payne, Jr., S. J. Pirson, J. M. Post, Paul H. Price, D. T. Ring, J. French, B. Robinson, Frank Schauer, A. C. Simmons.

E. N. Smith, L. L. Tonkin, H. A. Wallace, Jr., Don Wilson, L. M. Clark, I. G. Grettum, D. P. Hart.

Hon. Edward Martin, Governor of Pennsylvania, addressed "the victory dinner," Thursday night. Governor Martin stressed the great need of oil to win the war. "Without oil," he said, "both army and navy would be useless." He advocated an increase of 25 cents a barrel to keep prices of crude oil in line with farm, food and metal prices.

Thursday afternoon speakers discussed information and qualified doubtful points on rules and regulations set up by the government to cover materials and operating procedures.

Frank A. Watts, Director Materials Division, PAW, Washington, speaking on how the petroleum people fitted into the Controlled Materials Plan, said the petroleum industry must adjust its plan so that programs, schedules and operations are tuned to the procedures of the CMP.

In order that materials and other requirements be obtained, he advised each of the operating divisions, viz.: Production, natural gas, transportation refining, marketing, to synchronize its think-

ing in order that accurate materials surveys might be made.

Replacing Justin Wolf, Jack Jones, Washington counsel for Production Division of PAW, outlined "Government Regulations on Drilling," saying, "when rulings barred drilling of wells except under modifications that made profitable drilling risky, operators had best use their own judgment on whether to venture."

Four speakers talked on material conservation practices. Among them J. J. Schmidt, East Ohio Gas Co., Cleveland. He said coverage in his territory had resulted in nothing spectacular; he told how one large company had saved 730 tons of pipe and $7500 in labor.

John T. Galey, geologist of Pittsburgh, told of work in Southwest Pennsylvania to conserve steel, many new wells are drilled in hollows; he said a little more care is being given equipment, that exposed to the weather is cleared.

D. J. Henecker, manager, Wire Rope Division, Jones and Laughlin Steel Co., Pittsburgh, said wire rope had been standardized to lengthen its life and conserve steel, by reducing 973 catalogued items to 643 items, a 33.9 percent reduction.

R. C. Tucker, West Virginia Geological Survey, Morgantown, spoke on "Future Oil and Gas Supply in Eastern United States." Dr. Dotterweich, Petroleum Administration for War, Washington, spoke entirely off the record even for general reporting (release April 15 in Washington) on "War Products from Natural Gasoline."

"The gas companies," said Tucker, "may have to go into the coal business whether they like it or not. We have reserves of coal which will last several hundred years, so we are not likely to have to stop using gasoline and oil, although we will have to pay much more for these products when that time arrives. We may also have to use bottled gas for domestic purposes."

"West Virginia increased its production of oil in 1942 about 6.3 percent," according to Tucker, "but by far the greater part resulted from leaning-out operations, gas and air repressuring, with about 60 projects in operation."

Fair estimate of oil reserves remaining in the ground in Eastern United States totals probably 7,054,554,000 barrels, the speaker pointed out, but he added, "the greater proportion of this oil apparently will remain in the ground."

Supply and demand of gas for industrial uses were contrasted by H. J. Wagner, chief of the Gas Section of the Public Service Commission of West Virginia. Underground storage is the chief measure being taken to meet the apparent shortage of gas, and from 7 to 10½ billion cubic feet will be delivered to Eastern storage area through the Panhandle Eastern line, from April through September. Looping of the line will be completed, and a connecting line to East Ohio's system will be built, and these additions and extensions when put into operation in October or November, will provide approximately 50 million cubic feet of firm gas daily. If facilities are completed as planned, the East should have a total of from 10 to 13¼ billion cubic feet of gas.

Bureau Estimates 3,900,000 Barrels Daily Crude Oil Demand During April

Reporting that nation-wide rationing has reduced civilian demand much more than originally estimated, the Bureau of Mines last week forecast that April demand for domestic crude would average 3,900,000 barrels a day, 12,900 barrels less than in March but 269,700 barrels higher than the 1942 low of 3,630,300 barrels last April when almost 10,000,000 barrels of refined products stocks were liquidated.

Actual figures for January show a decline in the demand for all oils of about 14 percent from January, 1942, with motor-fuel demand decreasing 25 percent, distillate fuel oil 9 percent and residual fuel oil 7 percent.

"Data available for the first quarter of 1943 indicate a decline of about 10 percent in the total demand for all oils and the Bureau of Mines' current estimate for the second quarter of 1943 forecasts a probable decline of about 4 percent in total demand, compared with the same period in 1942," it was stated. "The progressive effect of restrictions on civilian consumption is being felt during the first half of 1943 and will apparently more than offset increasing war requirements. However, a substantial relative increase in the total demand for all oils seems probable in the latter part of 1943 compared with the same period of 1942.

"The three major products—motor fuel, residual fuel oil and distillate fuel oil—constitute about 80 percent of the total demand. The nation-wide rationing of gasoline to conserve rubber, effective in December, 1942, apparently has reduced civilian demand to a greater degree than was anticipated. During 1943, this reduction is expected to more than offset the increase in military and export requirements, with a consequent further material decrease in total gasoline demand. The full effect of the progressive conversions to other fuels of industrial and power plants using residual fuel oils, particularly in District 1, will be felt in 1943 and may largely offset the expected gains in railroad, shipping and naval uses. About 70 percent of the domestic demand for distillate fuel oils is for heating purposes.

Stocks

"Withdrawals from storage of over 58,000,000 barrels, about 12,000,000 barrels of crude and 46,000,000 barrels of refined products, were required to meet the total demand in 1942. If total demand and imports should remain the same and no further withdrawals from storage are made in 1943, a substantial increase in new production would be required to replace the supply obtained from storage in 1942. This would require a production of about 3,950,000 barrels daily in 1943, a gain of 4 percent compared with 1942, and crude runs to stills of about 3,730,000 barrels daily. If demand should prove to be much larger than in 1942, or a material increase in stocks were considered necessary, production would have to be expanded, imports increased, or civilian consumption further curtailed.

"While any forecast of demand for the year must be highly speculative and subject to constant revision," the bureau said, "it should serve a useful purpose in evaluating the uncertain factors involved. The indicated demand for crude petroleum in the first quarter of 1943 is about 3 percent below the bureau's forecasts. This suggests that operations should be stepped up in the near future or that demand will be less than anticipated for the year."

The bureau reported that daily crude production for the four weeks ended March 6 was 3,876,000 barrels and total runs to stills 3,658,000 barrels, while during the period stocks of domestic crude increased 105,000 barrels daily, indicating a demand for domestic crude of 3,771,000 barrels a day.

Although rationing has cut consumption and will narrow the range of seasonal changes drastically, the bureau foresaw a definite rise in both automotive and non-automotive uses of motor fuel in response to milder weather, while increasing military consumption will tend to keep demand from falling as low as it otherwise would. Total demand for motor fuel in April is estimated at 47,100,000 barrels—10 percent less than the actual demand in the same month last year.

Added Gasoline Storage

Stocks of finished and unfinished gasoline amounted to 88,677,000 barrels on January 31 and, according to American Petroleum Institute figures, increased approximately 4,100,000 barrels during February, bringing the onhand inventory to approximately 92,800,000 barrels February 28, compared with about 108,300,000 barrels on the same date in 1942. For both periods, however, these stocks represented about the same number of days' supply, it was pointed out. Pooling of stocks by distributors and elimination of some grades has reduced the quantity necessary for operations, but there is still a shortage in some districts and excessive inventories in others. The bureau estimated a further increase of 300,000 barrels this month.

Direct sales of natural gasoline are figured at 1,700,000 barrels, making an indicated refinery production of 45,700,000 barrels, to be distributed among the several refining districts as follows: East Coast, inland Texas, Texas Gulf Coast, Louisiana Gulf Coast and inland Louisiana-Arkansas, 19,810,000 barrels; Appalachian, 1,940,000 barrels; Indiana, Illinois, Kentucky, etc., 10,450,000 barrels; Oklahoma, 2,260,000 barrels; Kansas, 2,630,000 barrels; Rocky Mountain, 1,410,000 barrels; California, 7,200,000 barrels.

The forecast placed natural gasoline to be blended at refineries at 4,740,000 barrels. Application of an estimated yield of 37 percent to the straight-run and cracked gasoline production of 40,960,000 barrels gives total crude runs of 110,700,000 barrels, or 3,690,000 barrels daily.

Crude oil for export and to be used as fuel, and losses, is estimated at 6,500,000 barrels, making an estimated demand for domestic crude of 117,000,000 barrels, or 3,900,000 barrels daily.

Fuel Stocks Decline in Spite Of Production Gains

Reflected in continuing heavy demands for fuel oils of all classes, stocks of these products declined for the week ending April 3. Daily production of crude increased over the previous week, as did total crude stocks, but stocks of gasoline, distillate, and residual fuel were all below last week's figures.

Crude stocks were reduced 9.1 percent in spite of a 14.6 percent gain in daily average crude output. Rising military demands, as well as domestic needs necessitated the further draw on stocks.

Runs to stills were below those for the previous week by 118,000 barrels, probably as a result of transportation facilities to move needed oil being lacking. Gasoline production was up 130,000 barrels for the week, but this increase was not sufficient to prevent further withdrawals of manufactured stocks, bringing the total gasoline in storage 670,000 barrels below last week.

Weekly output of gas oil and distillates was up 362,000 barrels for the week, but here again the increase failed to offset draft on stocks, with the result that the total was 248,000 barrels below last week.

Residual fuels followed the same trend, with a difference of 455,000 barrels below last week's stock total.

Eastern Tank Car Movement At Peak

Better weather and expanding operation of the big-inch pipe line combined to raise tank-car deliveries into the East Coast area to a new all-time record of 912,919 barrels daily during the week ended April 3, it was reported by PAW April 8.

Topping 900,000 barrels for the first time, the week's receipts were 43,290 barrels above the previous high of 856,710 barrels for the week ended September 19, 1942, and was an increase of 88,262 barrels over the preceding week.

Box-car shipments of kerosine in drums to New England averaged 2047 barrels daily, a drop of 206 barrels from the preceding week, bringing the total rail movement to 933,966 barrels daily compared with 845,910 barrels.

Stocks in the area stood at 30.5 percent of normal, according to the API index, a 2-point drop in 4 weeks, it was shown.

Compact Commission Asks President to Increase Price

Adoption of a resolution to President Roosevelt urging a directive for an increase in crude oil prices highlighted the recent meeting of the Interstate Oil Compact Commission which met in Wichita, Kansas, last week. The resolution is to be presented to the President in person, by Andrew F. Schoeppel, governor of Kansas, and chairman of the commission.

A second resolution to PAW requested immediate approval of pipe and equipment for the proposed pipe line to be built for Stanolind Pipe Line Company from West Texas into Oklahoma.

March Drilling Results In Completions Gain

Drilling activity increased during March, with 196 more completions than were shown for February. Total weekly average was 369 wells as compared with 304 for February, and 346 for January.

Principal increases were shown in Illinois, Oklahoma and Texas, with a few slight gains in other scattered districts. Texas led, with 42 more completions

Crude Oil Production in the United States

(Estimates compiled by The Oil Weekly. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED April 3	April 10
Arkansas	70,900	70,700
California	780,100	778,100
Long Beach	33,200	33,300
Midway-Sunset	58,900	55,300
Kettleman Hills	45,150	44,500
Wilmington	95,050	94,600
Rest of State	547,800	550,400
Colorado	6,300	6,100
Illinois	238,300	269,350
Salem	31,300	30,900
Louden	37,100	45,050
Other New Pools	158,300	182,000
Old Pools	11,600	11,400
Indiana	15,700	15,850
Kansas	314,800	309,300
Kentucky	13,000	13,400
Louisiana	340,100	346,900
North	89,200	89,100
South	250,900	257,800
Michigan	56,300	56,150
Mississippi	54,600	55,250
Missouri	95	95
Montana	22,550	21,600
Nebraska	2,150	2,100
New Mexico	92,350	97,300
New York	14,150	15,200
Ohio	11,500	11,900
Oklahoma	344,000	344,100
Oklahoma City	59,950	59,450
Seminole Area	79,650	79,250
Rest of State	204,400	205,400
Pennsylvania	45,450	48,050
Tennessee	35	35
Texas	1,394,700	1,390,150
Upper Gulf Coast	353,000	340,950
East Texas Field	323,650	320,150
Rest of Eastern Texas	100,200	99,850
Lower Gulf Coast	106,300	116,950
Southwest Texas	50,950	54,050
South Central Texas	17,250	17,000
West Texas	217,350	214,550
North Texas	137,200	135,300
Panhandle	88,800	91,350
Utah	10	10
West Virginia	9,050	9,250
Wyoming	93,300	94,800
Total 8 Prorated States	3,336,950	3,336,550
Total United States	3,919,440	3,955,690

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gas Oil & Distillate Stocks Barrels	Gas Oil & Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1939	3,910	8- 5	3,650	10-21	278,607	5-26	87,769	4-22	39,562	10-28	116,237	8-26
1940	3,890	3-16	3,690	6-22	265,865	8-31	102,817	4-20	49,051	10-19	109,135	9-14
1941	4,337	11-22	[1]4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	[1]4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	49,861	11-14	95,857	1- 3
1943	3,918	4- 3	3,734	3-27	239,126	3-27	94,159	3-20	42,913	1- 2	72,881	1- 2
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1940	3,335	11-30	3,370	1- 6	237,339	1-27	79,847	11- 9	23,551	4- 6	102,344	2-10
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,381	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	82,420	1- 2	30,732	4- 3	67,483	4- 3

Trends in Week Ended:	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gas Oil and Distillate Production Weekly	Gas Oil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1942:									
January 3	4,038	3,961	244,440	13,797	92,987	3,855	49,357	6,918	95,857
January 31	3,871	3,848	250,740	13,292	97,810	3,817	40,674	6,640	91,189
February 28	4,016	3,675	259,373	12,131	105,635	.....	34,547	.....	88,285
March 28	3,820	3,667	263,208	11,663	105,624	.....	31,756	.....	83,045
April 25	3,581	3,506	257,073	10,535	102,897	.....	29,240	.....	81,107
May 30	3,877	3,522	255,023	10,478	95,355	.....	31,384	.....	79,628
June 27	3,719	3,581	253,364	10,713	88,396	.....	32,851	.....	77,304
July 25	3,691	3,658	249,262	10,864	82,281	.....	35,966	.....	77,816
August 29	3,964	3,697	249,007	11,300	80,831	.....	42,060	.....	78,034
September 26	3,909	3,802	242,785	10,954	80,550	.....	45,945	.....	78,943
October 31	3,901	3,731	239,266	11,153	79,159	.....	48,131	.....	79,166
November 28	3,878	3,736	234,850	11,269	78,854	.....	49,739	.....	77,796
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,683	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 3, 1943	**3,918**	**3,624**	.....	**10,361**	**93,409**	**3,903**	**30,732**	**8,209**	**67,483**
April 4, 1942	3,418	3,499	[4]263,208	11,190	106,406	3,492	30,095	6,569	81,953
Change:									
In week	+22	−118	+709	+130	−670	+362	−248	+191	−455
In year	+500	+125	−24,082	−829	−12,997	+411	+637	+1,640	−14,470
In year	+14.6%	+3.5%	−9.1%	−7.4%	−12.2%	+11.7%	+2.1%	+24.9%	−17.6%

[1] All time peak. [2] Lowest since April, 1922. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent States. [4] Stocks, March 28, 1942.

during March than in February. Illinois was second, with 40 more new wells, and Oklahoma was third with 31 additional completions. Kansas held fourth place, with 23 more than in February.

Undoubtedly drilling is being held back by the various factors now confronting operators, chief among which is the difficulty in obtaining the necessary materials needed for completing wells. Also, there is widespread hesitancy to start new operations when transportation of oil is so handicapped, and while there is the danger of having to operate at a loss on account of the low price of crude.

April may be expected to continue the upward trend of March though, with more favorable weather conditions that will prevail in practically all fields.

Permian Basin Pipe Line Proration Lifted

Pipe-line proration in the Permian Basin was discontinued April 1 by Humble Oil & Refining Company and The Texas Company. Return of these large buyers in West Texas and New Mexico fields to the maximum allowables runs eliminates pipe-line proration throughout the basin, except in the Square Lake field, Eddy County, New Mexico, where production is held considerably below allowable due to the local refinery being unable to absorb the output.

API Southwestern Program Devoted to War Problems

With practically all sessions devoted to problems arising from wartime conditions, a preliminary program for the Spring meeting of the Southwestern District, API, at the Rice Hotel, Houston, April 29-30, is announced.

Registration is set for Thursday morning, April 29. Reports from chapter officers will be heard, and then one paper will be given: "Petroleum Transportation in Central and Eastern United States," by T. E. Swigart, Shell Pipe Line Corporation.

Materials will be the subject of afternoon sessions on April 29, and papers include: "API Standardization Program in the War Effort," by J. F. Lucey, Lucey Petroleum Company; "Controlled Materials Plan," by D. G. Hawthorn, Chief of Equipment Section, Production Division, PAW; "Symposium on Materials," consisting of a series of short papers on use of materials in wartime, by J. B. Martzel, United Gas Pipe Line Company, and "API Cooperation in Steel Conservation," by C. A. Dunlop, Humble Oil & Refining Company; "Use of Materials in Secondary Recovery," by Paul D. Torrey, and "Removal of Paraffin in the University Oil Field," by Benjamin C. Craft, Louisiana State University.

Drilling and production practices are scheduled for Friday and the morning session includes two papers: "Reservoir Performance," by S. E. Buckley, Humble Oil & Refining Company; "Katy Recycling Project," consisting of plant operation by Frank D. Noble, Humble Oil & Refining Company, and field operations, speaker yet to be announced.

Manpower discussions and papers will conclude the program Friday afternoon, with: "Manpower Needs of Oil and Gas Industry," speaker to be announced; "Manpower from the Standpoint of Government," by Henry LeBlanc, acting Regional Director, Region X of the Manpower Commission; "Protection of Petroleum Facilities in Wartime," a movie with a discussion by Kraus Earhart, PAW, Houston; and "Utilization of Existing Vocational Training Methods for Wartime Conditions in the Oil Industry," by J. R. D. Eddy, State Department of Education, Austin.

Texas Commission Hearing Dates Are Announced

The next Statewide proration hearing has been scheduled by the Texas Railroad Commission for April 16, at the Blackstone Hotel in Fort Worth.

April 14—To determine whether or not operations are being conducted in violation of commission rules at Cayuga and Long Lake fields, Anderson, Freestone, and Henderson counties, and whether or not dual completion permits heretofore issued in these fields should be revoked or amended.

Well Completions Up in March, but More Rigs Become Inactive

State or District	MONTHLY COMPLETIONS, March, 1943									CUMULATIVE COMPLETIONS: First 3 Months									RIGS IN OPERATION					
	Details for March, 1943					Total Completions				Details, Jan.-March, 1943					Total Completions				Details for April 1, 1943			Total: Drlg., RU and SD		
	New Wells				Old Wells Deepened					New Wells				Old Wells Deepened										
	Oil*	Gas	Dry	Others[6]		Mar., 1943[1]	Feb., 1943[3]	Mar., 1942[2]	Total Footage March, 1943	Oil*	Gas	Dry	Others[6]		Jan.-Mar., 1943[2][5]	Jan.-Mar., 1942[4]	Percent Change	Total Footage 3 Months, 1943	Drilling	Rigs Up	Shut Down	Apr. 1 1943	Mar. 1 1943	Apr. 1 1942
Alabama															2									
Arkansas[7]	10		8			18	11	23	94,329	20		18		1	39	49	— 20.4	212,721	24	7	17	48	43	33
California[8]	89	1	22		1	113	92	37	360,666	227	2	84		1	314	222	+ 41.4	1,026,916	168	57	40	265	222	198
Colorado							2	1		2		3			5	3	+ 66.6	18,098	2		13	15	19	22
Florida																			1			1	1	2
Georgia															1						1	1		1
Illinois[9]	128	2	46	3	7	186	[10]146	84	450,790	311	7	135	11	12	476	484	— 1.6	1,165,284	126	26	32	184	213	139
Indiana	13	1	16			30	21	33	58,043	29	1	40		3	73	99	— 26.2	133,996	24	2	18	44	53	47
Iowa																			2			2	3	1
Kansas	64	3	47	4	4	122	99	96	390,247	158	9	157	6	12	342	409	— 16.3	1,114,614	179	22	7	208	175	157
Kentucky	21		14			35	16	9	71,137	41	1	26		1	69	42	+ 64.2	133,374	39	4	7	50	72	19
Louisiana	27	1	14			42	47	99	316,313	76	7	48			131	281	— 53.3	938,070	103	11	22	136	110	162
North	7	1	5			13	29	48	62,585	25	4	23			52	126	— 58.7	227,661	42	4	14	60	46	66
South	20		9			29	18	51	253,728	51	3	25			79	155	— 49.0	710,409	61	7	8	76	64	96
Michigan	19		19			38	34	43	95,239	48	4	51			103	170	— 39.4	272,001	66	34	31	131	94	133
Mississippi	1		1			2	4	13	14,478	1		5			6	43	— 86.0	36,742	7		7	14	12	12
Missouri[11]			1			1	1	3	609	1		2			3	9	— 66.6	3,424	1			1	7	5
Montana	2					2	24	8	5,837	15	18	5			38	36	+ 5.5	69,483	18	10	13	41	41	64
Nebraska								1								9			1		1	2	22	24
New Mexico	12		7			19	20	46	59,352	35		20		5	60	105	— 42.8	162,038	40	1	21	62	65	124
New York	64	1		31		96	75	110	134,391	190	2	1	85		278	323	— 13.9	380,112	84	28	21	133	133	127
North Dakota																					1	1		
Ohio	14	42	21			77	59	77	222,550	35	111	64	1	3	214	326	— 34.3	549,634	148	21	36	205	206	108
Oklahoma	46	11	57	4	4	122	91	125	381,413	112	26	151	11	23	323	446	— 27.5	970,912	179	15	19	213	232	223
Oregon																							1	
Pennsylvania[12]	88	28	6	83	1	206	208	323	358,578	275	68	16	254	6	619	923	— 32.9	1,055,909	187	29	46	262	246	296
South Dakota																			2		1	3	2	2
Tennessee[13]								1			1				1	3	— 66.6	1,358	2	1	1	4	2	4
Texas	166	9	134	1	8	318	276	555	1,350,552	447	43	365	15	25	895	1,917	— 53.3	3,697,850	497	38	85	620	575	842
E.T.Bor.Co.'s	3					3	2		18,177	5					5	2	+150.0	30,228	2		3	5	9	5
E. Tex. Field							2						2		2	11	— 81.8	4,280						2
Rest of E. Tex.	8	1	3			12	23	31	64,031	26	1	20			47	128	— 63.2	260,203	27	1	6	34	28	35
North Texas	33		40	1	4	78	66	59	217,313	76		114	12	9	211	324	— 34.8	557,628	89	3	19	111	110	105
West Central	4	2	14			20	28	36	42,241	16	7	43		4	70	118	— 40.6	151,975	41	3	9	53	45	52
West Texas	57	1	19		2	79	60	191	348,762	157	3	37		6	203	560	— 63.7	877,092	181	7	25	213	209	273
Panhandle	9	1	6		1	17	21	31	49,266	31	17	10		5	63	161	— 60.8	179,986	22	8	2	32	31	52
Upper Coast	12		12			24	15	46	183,045	32	1	27			60	154	— 61.0	441,351	40	4	7	51	41	83
Lower Coast	30	2	15		1	48	32	90	290,786	72	12	40	1	1	126	273	— 53.8	794,127	61	7	5	73	65	133
Southwest	9	2	20			31	19	54	124,656	29	2	58			89	145	— 38.6	346,191	25	4	6	35	25	57
South Central	1		5			6	8	17	12,275	3		16			19	41	— 53.6	54,789	9	1	3	13	12	45
Utah																			2		2	4	5	3
West Virginia	3	29	10		3	45	35	64	122,580	14	92	30		8	144	190	— 24.2	398,968	36	5	9	50	61	190
Wyoming	4					4	19	10	10,780	27	1	2			30	21	+ 42.8	121,242	14	4	14	32	37	36
Total U. S.	771	128	423	126	28	1,476	1,280	1,761	4,497,884	2,064	393	1,223	383	100	4,163	6,113	— 31.8	12,462,746	1,952	315	465	2,732	2,653	2,979

* Includes distillate wells. [1] Wells completed in 5 weeks, or 35 days, ended March 27, 1943. [2] Well completed in 5 weeks, or 35 days, ended March 28, 1942. [3] Wells completed in 4 weeks, or 28 days, ended February 20, 1943. [4] Wells completed in 13 weeks, or 91 days, ended March 28, 1942. [5] Wells completed in 13 weeks, or 91 days, ended March 27, 1943. [6] Water input, gas injection, and salt water disposal wells. [7] Figures from Arkansas Oil & Gas Commission beginning January, 1943, except for March, 1943. [8] California figures from A.P.I. except for March, 1943. [9] Data on new wells from Illinois Geological Survey beginning January 1942, except for March, 1943. [10] Illinois statistics for February revised to embody State Geological Survey data on new wells. [11] Figures from Missouri Geological Survey. [12] Bradford and Kane-Clarendon, Pennsylvania, figures from The Producers Monthly. [13] Figures from Tennessee Division of Geology.

Gravity-Scale Crude Oil Prices in Mid-Continent Fields

Posted in most instances between May 19 and May 21, 1941

GRAVITY	Oklahoma-Kansas		North Louisiana-Arkansas					Inland Texas and New Mexico			South Texas		Texas Gulf Coast			Louisiana Gulf Coast							
	Stanolind, Gulf, Texas, Skelly, Barnsdall, Tidewater, Sinclair, Phillips	Carter, Magnolia, Shell	[1]Rodessa, etc.	[2]Champagnolle, etc.	Bunkie, Eola, Olla, S. Olla, Little Crk. (by Standard)	Lisbon, La (by Gulf)	[3]Atlanta, Buckner, etc., Ark.	North and West Central Texas	[4]Eastern Texas	West Texas, [17]Panhandle, New Mexico	[5]Refugio Type	[6]Mirando Type	[7]Gulf Coast	[8]Anahuac Type	[9]Dickinson Type	[10]Gulf Coast	[11]Standard of La.	[12]Texas Co.	[13]Texas Co.	[14]Magnolia Pet. Co.	[15]Shell Oil Co.	Jennings (by Gulf)	[16]Rocky Mt. Area (Salt Creek, etc.)
17–17.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	$0.94	....	....	....
18–18.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.96	....	....	....
19–19.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.98	$0.99	....	....
20–20.9	$0.85	$0.75	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.00	1.01	....	....
21–21.9	.87	.78	....	....	....	....	$0.68	$0.81	$0.80	$0.70	$1.08	$1.03	$1.06	$0.98	$0.93	$1.06	....	....	....	1.02	1.03	....	....
22–22.9	.89	.81	....	....	....	....	.70	.83	.82	.72	1.10	1.05	1.08	1.00	.95	1.08	$0.90	....	....	1.05	1.05	....	....
23–23.9	.91	.84	....	....	....	....	.72	.85	.84	.74	1.12	1.07	1.10	1.02	.97	1.10	.92	....	....	1.08	1.07	....	....
24–24.9	.93	.87	$0.88	$0.86	$1.03	....	.74	.87	.86	.76	1.14	1.09	1.12	1.04	.99	1.12	.94	....	....	1.11	1.09	....	....
25–25.9	.95	.90	.90	.88	1.05	....	.76	.89	.88	.78	1.16	1.11	1.14	1.06	1.01	1.14	.96	....	....	....	....	....	....
26–26.9	.97	.93	.92	.90	1.07	....	.78	.91	.90	.80	1.18	1.13	1.16	1.08	1.03	1.16	.98	....	....	1.14	1.11	....	....
27–27.9	.99	.96	.94	.92	1.09	$0.81	.80	.93	.92	.82	1.20	1.15	1.18	1.10	1.05	1.18	1.00	....	....	1.17	1.13	....	....
28–28.9	1.01	.99	.96	.94	1.11	.83	.82	.95	.99	.84	1.22	1.17	1.20	1.12	1.07	1.20	1.02	....	....	1.19	1.15	....	....
29–29.9	1.03	1.02	.98	.96	1.13	.85	.84	.97	1.01	.86	1.24	1.19	1.22	1.14	1.09	1.22	1.04	....	....	1.21	1.17	....	....
30–30.9	1.05	1.05	1.00	.98	1.15	.87	.86	.99	1.03	.88	1.26	1.21	1.24	1.16	1.11	1.24	1.06	$1.06	....	1.23	1.19	....	$0.96
31–31.9	1.07	1.07	1.02	1.00	1.17	.89	.88	1.01	1.05	.90	1.28	1.23	1.26	1.18	1.13	1.26	1.08	1.08	....	1.25	1.21	....	.98
32–32.9	1.09	1.09	1.04	1.02	1.19	.91	.90	1.03	1.07	.92	1.30	1.25	1.28	1.20	1.15	1.28	1.10	1.10	$1.05	....	....	....	1.00
33–33.9	1.11	1.11	1.06	1.04	1.21	.93	.92	1.05	1.09	.94	1.32	1.27	1.30	1.22	1.17	1.30	1.12	1.12	1.07	1.27	1.23	$1.07	1.02
34–34.9	1.13	1.13	1.08	1.06	1.23	.95	.94	1.07	1.11	.96	1.34	1.29	1.32	1.24	1.19	1.32	1.14	1.14	1.09	1.29	1.25	1.09	1.04
35–35.9	1.15	1.15	1.10	1.08	1.25	.97	.96	1.09	1.13	.98	1.36	1.31	1.34	1.26	1.21	1.34	1.16	1.16	1.11	1.31	1.27	1.11	1.06
36–36.9	1.17	1.17	1.12	1.10	1.27	....	.98	1.11	1.15	1.00	1.38	1.33	1.36	1.28	1.23	1.36	1.18	1.18	1.13	1.33	1.29	1.13	1.08
37–37.9	1.19	1.19	1.14	1.12	1.29	....	1.00	1.13	1.17	1.02	1.40	1.35	1.38	1.30	1.25	1.38	1.20	1.20	1.15	....	....	1.15	1.10
38–38.9	1.21	1.21	1.16	1.14	1.31	....	1.02	1.15	1.19	1.04	1.42	1.37	1.40	1.32	1.27	1.40	1.22	1.22	1.17	....	....	1.17	1.12
39–39.9	1.23	1.23	1.18	1.16	1.33	....	1.04	1.17	1.21	1.06	1.44	1.39	1.42	1.34	1.29	1.42	1.24	....	1.19	....	....	1.19	1.14
40 & Up	1.25	1.25	1.20	1.18	1.35	....	1.06	1.19	1.23	1.08	1.46	1.41	1.44	1.36	1.31	1.44	1.26	....	1.21	....	....	1.21	1.16
							1.08	1.21	1.25	1.10	1.48	1.43	1.46	1.38	1.33	1.46	1.28	....	1.23	....	....	1.23	1.18
									1.27	1.12	1.50	1.45	1.48	1.40	1.35	1.48	1.30	....	1.25	....	....	1.25	1.20

[1] Gulf schedule for Caddo, Homer, Haynesville, Bull Bayou, Crichton, De Soto, El Dorado and Rodessa, Texas. Standard of La. schedule for Cotton Valley, Rodessa, Shreveport (Cross Lake), and Caddo. Magnolia schedule for Haynesville, Cotton Valley, Rodessa, and Miller Co., Ark. Texas Co. schedule for "North Louisiana."

[2] Schedule of Standard of La. for De Soto, Sabine, Fouke, Homer, Miller Co., Sugar Creek. Schedule of Root Petroleum Co. for Nick Springs, Urbana light, Schuler sweet, Rainbow, South Field (El Dorado), and Champagnolle.

[3] Schedule of Standard of La. for Atlanta, Buckner, Magnolia, Schuler: Jones sand. Village. Schedule of Root Petroleum Co. for Schuler: Reynolds lime, and Schuler: Jones sand.

[4] Humble schedule for Anderson, Cherokee, Limestone, and Navarro counties and Navarro Crossing field, except that prices from 80 to 92 cents represent postings only for Hawkins field. Wood County. Rodessa, Texas, prices are same as in Rodessa, La.-Ark.

[5] Schedule for Refugio, E. White Point, Greta, Melon Creek, Midway, Minnie Bock, O'Connor-McFaddin, Plymouth, Saxet, Taft, and Tom O'Connor.

[6] Schedule for Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (N. and S.), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manila, Mirando Valley, Placedo, Randado, Sarnosa, and Tesoro.

[7] Humble schedule for Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa, Mykawa new, Raccoon Bend, South Thompsons, Sugarland, Thompsons, Webster. Texas Co. schedule for Ariola, Ganado, Hamman, Hillje, Humble, Kubela, Magnet, Manvel, Markham, Mauritz, Old Ocean, Pickett Ridge, Port Neches, Sour Lake, West Columbia, Withers; except that schedule provides $1.36 top, 34 gravity. Pan American Prod. Co. schedule for Hastings and South Houston. Gulf schedule for Spindle Top, Sour Lake, Lovells Lake, West Beaumont, Goose Creek, South Liberty, Big Creek, Blue Ridge, Fannett, Moore, Barbers Hill, Hankamer, Thompsons, Lochridge, Dyersdale, and Hull (old) crudes. Sun schedule for Barbers Hill, Batson old, Cotton Lake, Esperson below 35 gravity, Goose Creek, Greens Lake, Hull below 25, Humble below 25, Nome, North Dayton below 25, Orange, Saratoga, Sour Lake, South Liberty, Point, Fishers' Reef, Hull old and new, Pierce Junction, Red Fish Reef, Turtle Bay fields. Sun schedule for Anahuac, Caplen, and Turtle Bay. Gulf schedule for Anahuac, Hull new, Pierce Junction, Orange and Thompsons deep.

[8] Humble schedule for Anahuac, Angleton, Cedar Humble schedule for Anahuac, South Liberty, League City, and Rowan fields. Pan American Prod. Co. schedule for Gillock crude.

[9] Humble schedule for Dickinson, Gillock, Hardin, Texas Co. schedule for Bay St. Elaine, Caillou Island, Iberia, Lake Barre, Lake Pelto, Leesville and Port Barre for crude ranging in gravity up to 27-27.9; for lighter oils in those fields see Footnote 12. Gulf schedule for Edgerly, Starks, Vinton, E. Hackberry, Cameron Meadows, Leesville. Deduct 10 cents for Gulf's prices for Timballer Bay, Grand Bay, Quarantine Bay, and West Bay. Deduct 2 cents for Standard of La. prices for Fauase Pointe, Hackberry (E. and W.), and Vinton.

[10] Sun Oil Co. schedule for Bayou Blue, Chacahoula, Houma, Lake Barre, Lake Pelto, Leesville and Port Iberia, Caillou Island, Bay St. Elaine, Vinton, E. Hackberry, Cameron Meadows, Leesville. Deduct 10 cents for Gulf's prices for Timballer Bay, Grand Bay, Quarantine Bay, and West Bay. Deduct 2 cents for Standard of La. prices for Fauase Pointe, Hackberry (E. and W.), and Vinton.

[11] Standard of La. schedule for Bayou Mallet, Choctaw, Darrow, Jeanerette, Lirette, N. Crowley, S. Crowley, Port Barre, Potash, Roanoke, St. Martinville. Deduct 10 cents for Anse La Butte.

[12] Texas Co. schedule for Bateman Lake, Dog Lake, Fauase Point, Horseshoe Bayou, Jefferson Island, Plumb Bob, Vermilion Bay, West Cote Blanche, and Delta Duck Club. Add 8 cents to these prices for Texas Co. postings for 28 or higher gravity at Bay St. Elaine, Caillou Island, Iberia, Lake Pelto, Leesville, Port Barre, and Lake Barre.

[13] Texas Co. schedule for Delta Farms, Golden Meadows, Lake Salvador.

[14] Magnolia schedule for Lockport, Cameron Meadows, West Gueydan.

[15] Shell Oil Co. schedule at Iowa, Black Bayou, White Castle. For Shell's prices at Roanoke and Chalkley fields deduct 5 cents. For Shell's prices at Gibson, South Houma, Hester, and West Lake Verret fields deduct 10 cents.

[16] Sinclair-Wyoming Oil Co. prices at Salt Creek, Lost Soldier, Iron Creek, effective May 20, 1941. Deduct 10 cents for East Mahoney and deduct 20 cents for Mahoney and Wertz.

[17] Add 3 cents for Panhandle prices.

MID-CONTINENT FLAT PRICES

FIELD—	Flat Price	Date Posted
Arkansas:		
Big Crk., McKamie, Macedonia, Dorcheat, sour dist.	$1.25	2– 3–43
Dorcheat, Macedonia dist'l.	1.30	11–16–42
Smackover, Heavy	.83	5–22–41
Texarkana sweet distillate	1.40	–42
Louisiana, North:		
Cotton Valley Distillate	1.40	9– 1–41
Cotton Valley (Holloway sn.)	1.25	5–22–41
Lisbon Distillate	1.20	5–22–41
Urania	1.15	5–22–42
Louisiana, South:		
Erath	1.21	5–21–41
Garden Island	1.36	5–21–41
Happytown	1.15	5–20–41
Lafitte, Paradis	1.19	5–21–41
Lake Arthur & Tepetate	1.18	5–21–41
Lake Mongoulois	1.36	5–21–41
Ville Platte	1.20	5–21–41
Nebraska:		
Falls City, in field	.90	8– 1–41
Falls City, in tank cars	.95	8– 1–41
Shubert, in tank cars	.97	8– 1–41
Texas:		
Alice, Benavides (No. Sweden), Ben Bolt, Clark-Muil. Sun and Tom Graham	1.35	5–21–41
Cayuga	.90	5–21–41
Chapel Hill 50° and up	1.25	3–19–42
Chapel Hill below 50°	1.18	1–20–42
Clay Creek	1.00	5–22–41
Cleveland	1.26	5–21–41
Conroe	1.43	5–21–41
Esperson 35° & up; S. Esperson (Sun Oil)	1.30	5–22–41
East Texas, Flag Lake	1.25	5–20–41
Flour Bluff, East Flour Bluff, and La Rosa	1.33	5–21–41
Hockley-Cochran Counties	.87	5–21–41
Livingston, Cleveland	1.25	5–20–41
Long Lake	1.23	5–21–41
Luling	1.05	5–21–41
Lytton Springs	1.17	5–21–41
North Rincon	1.45	2– 3–43
Salt Flat, North Salt Flat, Darst Creek, Hilbig, Carroll, Clark, Zoboroski	1.14	5–21–41
Satsuma, Tomball	1.40	5–21–41
Sun Oil Co. at Batson (new), Fig Ridge, Hardin, Hull 25 and up, Humble 35 and up, LaBelle, N. Dayton 25 and up, Oyster Bayou, Seabreeze, S. China, W. Orange and Willow Slough	1.25	5–22–41
South Cotton Lake	1.35	5–22–41
Sun, N. Sun, N. Rincon, Garcia	1.35	5–22–41
Talco	.79	5–21–41
Van	1.08	5–21–41
Yates (Deep)	.95	5–20–41
Yates (Shallow)	.82	5–20–41
Yturria (Sun in S. Texas)	....	....

MICHIGAN PRICES

Central (Basin):		
Porter, Greendale, Crystal, Wise, Midland, Vernon, Saginaw	$1.44	5–27–41
Buckeye, Edenville, Bentley, Beaverton, Monitor, Kawkawlin	1.42	5–27–41
Freeman, Lincoln, Sherman Redding, Temple, Winterfield, Trenton-Monroe Co., Fork Twps.-Mecosta Co.	1.39	5–27–41
Hamilton-Grout	1.29	5–27–41
Adams	1.27	6– 1–41
Arenac, Clayton, Ogemaw, W. Branch	1.24	5–27–41
Southwest (Shallow):		
Traverse, crude in Allegan, Kent, Ottawa, Van Buren Counties	1.45	6– 2–41
Clare	1.11	5–27–41

MIDDLE WEST PRICES

FIELD—	Flat Price	Date Posted
Lima, Ohio-Ind.	$1.50†	10–28–42
Illinois Basin (Sohio Corp.)	1.37	5–19–41
Lake Centralia-Salem, Illinois	1.37	5–19–41
Eastern Ill.-Western Ind.	1.22	5–19–41
Western Kentucky	1.32	5–21–41
Birk City, Western Kentucky	1.32	5–21–41
Kentucky River, Eastern Ky.	1.43	5–21–41
Big Sandy River, Eastern Ky.	1.38	6–19–41
Cleveland, Lodi, Chatham, Ohio	1.30	6–19–41
		9– 1–41

ROCKY MOUNTAIN STATES PRICES

Colorado:		
Canon City and Florence	$1.05	5–21–41
Iles	1.07	5–20–41
Montana:		
Cat Creek	1.15	4– 1–41
Cut Bank (6 Buyers)*	1.05-1.20	3–30–42
Dry Creek	1.02	5–20–41
Sunburst	1.00	5–20–41
New Mexico:		
Artesia	.94	5–21–41
Hogback	1.00	10–11–38
Wyoming:		
Big Muddy	1.08	5–30–41
Byron	.70	3– 4–43
Elk Basin	1.00	5–21–41
Frannie, Light	.85	2–26–43
Frannie, Heavy	.62	2–26–43
Garland	.60	3– 4–43
Grass Creek, Light	1.00	5– 1–41
Grass Creek, Heavy	.65	4– 1–43
Hamilton Dome	.60	2–26–43
Lance Creek (Ohio Oil Co.)	1.12	7– 1–41
Mill Creek	.72	10–11–38
Oregon Basin	.65	3– 4–43
Osage	1.30	10–11–38
Poison Spider	.65	2–26–43
Rock River	1.15	5–21–41
Tensleep	.6785	5–20–41

*About 25% of Cut Bank crude brings $1.20 per barrel; 65% less than $1.20 and minimum $1.10; and 10% less than $1.10.

†$1.50-price applies to about ¾ of field's production; $1.60 to ¼ of it.

Wholesale Prices of Refined Products in Principal Markets

REFINED GASOLINE	Current Range (Cents a gal.)		Changes from Month Ago	
Oklahoma Refineries:				
60 Octane and Under	5⅛	5¼	...	...
63-66 Octane	5⅛	5⅝	...	...
72-74 Octane	5⅞	6	...	...
78 Octane, Ethyl	6¾	6⅞	...	...
Mid-Western Tank Car:				
60 Octane and Under	5⅛	5¼	...	...
63-66 Octane	5⅛	5⅝	...	...
72-74 Octane	5⅞	6	...	...
78 Octane, Ethyl	6¾	7⅛	...	...
New York Harbor:				
68-70 Octane	9¼	9¼	...	...
72-74 Octane	9¼	9⅜	...	+⅛
†Gulf Coast:				
60 Octane unleaded	5	5	...	...
65 Octane unleaded	5¼	5¼	+⅛	+⅛
68 Octane unleaded	5⅜	6⅜	+¼	+1
70 Octane unleaded	5⅝	5⅜	+⅛	+⅛
72-74 Octane leaded	5¾	5¾	...	...
Min. 89 Octane, '39 Research	6	6⅞	+¼	+⅞
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	3⅞	3⅞	...	...
F.O.B. Br'kenr'ge, Tex.	3½	3½	...	...
KEROSINE				
Oklahoma Refineries:				
41-43 water white	4⅜	4½	...	...
42-44 water white	4½	4½	...	...
Mid-Western Tank Car:				
41-43 water white	4⅜	4⅜	...	...
42-44 water white	4½	4½	...	...
New York Harbor	7⅛	7⅛	+¼	+¼
†Gulf Coast:				
41-43 water white	4⅛	4⅛	+¼	+¼
RANGE OIL				
At Oklahoma Refineries	4	4⅛	...	...
In Mid-Western Market Group 3, basis	4	4	...	...
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 prime white	3⅞	3⅞	...	...
No. 1 straw	3⅞	4	...	...
No. 2 straw	3⅝	3⅝	...	...
No. 3	3½	3½	...	...
Mid-Western Tank Car:				
No. 1 prime white	3⅞	3⅞	...	...
No. 2 straw	3⅝	3⅝	...	...
No. 3	3½	3½	...	...
New York Harbor:				
No. 1	7⅛	7⅛	+¼	+¼
No. 2	6¾	6¾	...	...
No. 3	6¾	6¾	...	...
†Gulf Coast:				
No. 2	3¾	3¾	...	...

HEAVY FUELS	Current Range (Per Bbl.)		Changes from Month Ago	
Oklahoma Refineries:				
No. 6	...	...	...	...
14-16 Gravity	$0.97	$0.97	...	...
Mid-Western Tank Car:				
No. 5	.85	.85	...	...
No. 6	.80	.80	...	...
New York Harbor:				
No. 5	1.95	2.01	...	—.09
No. 6	1.65	2.07	...	+.42
BUNKER C FUEL OIL (Per barrel, ships' bunkers)				
†Gulf Coast	$0.85	$1.27	...	+.42
New York Harbor	1.65	2.07	...	+.42
DIESEL OIL (Per barrel, ships' bunkers)				
†Gulf Coast	$1.65	$1.65	...	...
New York Harbor	2.78	2.78	...	...
LUBRICATING OIL (Cents a gallon)				
Oklahoma Refineries:				
Bright stock (viscosity at 210°):				
200 vis. D, 10-25 pour point	.27	27	...	...
150-160 vis. D:				
0-10 pour point	.23	23	...	...
10-25 pour point	.22½	23	...	...
25-40 pour point	.23	23	...	...
150-160 vis. E	.22	22	...	...
120 vis. D, 0-10 pour point	.22	22	...	...
Cylinder Stocks:				
600 s.r. dark green	8½	8½	...	...
600 s.r. olive green	.10	11	...	...
631 s.r.	.18½	18½	...	...
Neutral Oils (viscosity at 100°, 0-10 pour point):				
Pale Oils:				
60- 85 vis. No. 2 color 8	8	8	...	...
86-110 vis. No. 2 color 8½	8½	8½	...	...
150 vis. No. 3 color	.14½	14½	...	...
180 vis. No. 3 color	.15	15	...	...
200 vis. No. 3 color	.15	15	...	...
250 vis. No. 3 color	.16	16½	...	...
280 vis. No. 3 color	.17	17	...	...
300 vis. No. 3 color	.18	18	...	...
Red Oils:				
180 vis. No. 5 color	.15	15	...	...
200 vis. No. 5 color	.15	15	...	...
280 vis. No. 5 color	...	...	...	...
300 vis. No. 5 color	.17½	17½	...	...
Western Pennsylvania: Cylinder Stocks:				
600 s.r. filtrable	.15	15	...	...
650 s.r.	.15½	15½	...	...
600 flash	.16	16	...	...
630 flash	.17	17	...	...

LUBRICATING OIL (Cents a gal.)			Changes from Month Ago	
Bright Stock (No. 8 Color, 145-155 vis. at 210°, 540-550 fl.):				
10 pour test	30½	30½	...	...
15 pour test	29½	29½	...	...
25 pour test	25	25	...	...
Viscous Neutrals (No. 3 Color, vis. at 70°):				
200 vis. (180 at 100), 420-425 fl.:				
Zero pour test	31½	31½	...	...
10 pour test	30½	30½	...	...
15 pour test	29½	29½	...	...
25 pour test	23	26	...	...
150 vis. (143 at 100), 400-405 fl.:				
Zero pour test	29½	29½	...	...
10 pour test	28½	28½	...	...
15 pour test	27½	27½	...	...
25 pour test	21	24	...	...

EASTERN STATES CRUDE OIL PRICES

FIELD—	Flat Price	Date Posted
Bradford-Allegany	$3.00	3-26-42
Sw. Pa. Pipe Line	2.65	3-26-42
Eureka Pipe Line, W. Va.	2.59	3-26-42
Corning Grade, Ohio	1.31	5-27-41
Buckeye Crude, Ohio	2.30	6-18-41

MAJOR CRUDE OIL PRICE CHANGES

	Penna. Grade	Mid-Cont. (36 Gr.)	Calif. (26 Gr.)
Feb. 1, 1940	.....	.....	Cut *7
May 22, 1940	Cut 25	.....	.....
June 18, 1940	Cut 25	.....	.....
July 12, 1940	Cut 25	.....	.....
Aug. 28, 1940	Cut 15	.....	.....
Nov. 12, 1940	Up 15	.....	.....
Dec. 17, 1940	Up 15	.....	.....
Jan. 27, 1941	Up 15	.....	.....
April 1, 1941	.....	Up 5	.....
April 23, 1941	Up 10	.....	.....
April 24, 1941	.....	.....	Up *6
May 19, 1941	.....	Up 10	.....
May 21, 1941	Up 15	.....	.....
May 22, 1941	.....	.....	Up *6
June 18, 1941	Up 20	.....	.....
Aug. 14, 1941	Up 23	.....	.....
Aug. 25, 1941	Cut 23	.....	.....
March 26, 1942	Up 25	.....	.....
April 1, 1943	.....	.....	Up ‡25

* Signal Hill 26 gravity.
† Cargoes, domestic and export.
‡ 14 and 15 gravity.

CRUDE OIL PRICES IN CALIFORNIA

Prices per barrel in field, posted by Standard Oil Company of California, effective April 1, 1943.
All gravities above those quoted take highest price offered in that field.

GRAVITY	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda, Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier, East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Newhall, Kern River, Kern Front, McKittrick, Round Mountain	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills, Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge	Kettleman Hills	Elwood Terrace
14-14.9	....	$0.93	....	....	$0.96	....	$0.95	....	$0.95	$0.95	$0.95	$0.97	....	....	$0.98	....	....	....	$0.98	$0.98	$0.98	....	....	....
15-15.9	....	.96	....	....	1.00	$1.01	.97	....	.97	.96	.97	.97	....	....	*Playa	....	....	....	.98	.98	.98	....	....	....
16-16.9	....	.96	$1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	del	....	....	....	.98	.98	.98	....	....	....
17-17.9	....	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	Rey	....	....	....	.98	.98	.98	....	....	....
18-18.9	$0.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	.88	....	....	....	.98	.98	.98	....	....	....
19-19.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	.88	....	....	$0.98	.98	.98	.98	....	....	....
20-20.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	.88	....	....	.98	.98	.98	.98	....	....	....
21-21.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	.88	....	....	.98	.98	.98	.98	....	....	....
22-22.9	.96	.98	1.02	$0.88	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	.88	....	....	.98	.98	.98	.98	$0.76	....	....
23-23.9	1.00	1.02	1.05	.92	1.02	1.01	.98	....	.97	.98	1.00	.97	....	....	.91	....	....	.98	.99	.98	.98	.80	....	....
24-24.9	1.03	1.06	1.07	.97	1.05	1.04	1.01	....	1.01	1.02	1.03	.97	$0.99	....	.95	....	....	.98	1.03	.99	.98	.83	....	....
25-25.9	1.07	1.09	1.10	1.01	1.08	1.07	1.04	....	1.05	1.06	1.07	.98	1.02	....	.99	....	....	.98	1.07	1.01	.98	....	....	....
26-26.9	1.11	1.12	1.12	1.06	1.11	1.10	1.08	....	1.09	1.10	1.11	1.01	1.06	....	1.03	....	....	.98	1.11	1.04	.98	....	....	....
27-27.9	1.15	1.15	1.15	1.10	1.14	1.14	1.11	....	1.13	....	1.15	1.05	1.10	$1.04	....	....	....	1.01	1.15	1.07	.98	....	....	....
28-28.9	1.18	1.18	1.17	1.15	1.17	1.17	1.14	....	1.17	....	....	1.08	1.13	1.08	....	....	....	1.04	1.19	1.10	1.00	....	....	....
29-29.9	1.20	1.21	....	1.19	1.20	1.20	....	$1.17	....	....	....	1.12	1.17	1.12	....	....	....	1.07	1.24	1.13	1.02	....	....	....
30-30.9	1.23	1.24	....	....	1.23	1.22	....	1.21	....	....	....	1.15	1.21	1.15	....	$1.01	$1.09	1.10	1.28	1.16	1.04	....	....	FOB
31-31.9	....	....	....	....	....	1.24	....	1.25	....	....	....	1.19	1.24	1.19	....	1.04	1.12	1.14	....	....	1.06	....	....	Ship
32-32.9	....	....	....	....	....	....	....	1.29	....	....	....	1.23	1.28	1.23	....	1.07	1.14	1.17	....	....	1.09	....	....	....
33-33.9	....	....	....	....	....	....	....	1.32	....	....	....	1.27	....	1.26	....	1.10	1.17	....	....	....	1.11	....	....	$1.22
34-34.9	....	....	....	....	....	....	....	1.36	....	....	....	1.31	....	1.30	....	1.13	1.20	....	....	....	1.13	....	....	1.25
35-35.9	....	....	....	....	....	....	....	....	....	....	....	1.35	....	....	....	1.16	1.22	....	....	....	....	....	$1.23	1.28
36-36.9	....	....	....	....	....	....	....	....	....	....	....	1.39	....	....	....	1.19	1.25	....	....	....	....	....	1.26	....
37-37.9	....	....	....	....	....	....	....	....	....	....	....	1.43	....	....	....	1.22	....	....	....	....	....	....	1.29	....
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.47	....	....	....	1.25	....	....	....	....	....	....	....	....
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	....	....	....	....
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	....	....	....	....

* Effective April 1, 1943, posted by Union Oil Company of California.

East Saved

[Continued from page 35]

ly a position so sensitive as that of petroleum supplies. But if we are guided by the facts before us today—and we can not well be guided by anything else—we can conclude only that we are by no means out of the woods; that to enter next winter as well supplied as we were this winter represents a colossal task considering the condition of inventory, and that there is every present indication that we face deficiencies ahead."

Meanwhile, there was convincing evidence that all of the agencies concerned with oil in any way were now working shoulder to shoulder to boost the Eastern supply.

WPB, which a year ago was cool to any suggestion that valuable material be buried in the form of pipe lines, now appears ready to concede quickly to any proposals submitted by Ickes, as demonstrated by its quick approval of the second leg of the "little-big-inch" line even before the first section was put under construction.

At the same time, ODT programmed construction to cost nearly $1,000,000 to improve Eastern unloading facilities to speed the turn-around of tank cars, and announced that when betterments are completed within the next few months 23 terminals will be able to handle 950 more cars a day than at present.

Work has already started on four projects along the Central Railroad of New Jersey, to cost approximately $615,500, ODT Director Eastman said; rail improvements also are to be made by the New York, New Haven and Hartford Railroad at Providence, R. I., and by Shell Oil Company, Cities Service Oil Company, The Atlantic Refining Company, General American Tank Storage and Terminal Company, Socony-Vacuum Oil Company, Sinclair Refining Company, Hartol Products Company, Sun Oil Company, Standard Oil Company (New Jersey), Pan American Petroleum and Transport Company, and The Texas Company.

Eastman explained that the 950-car increase in terminal capacity will add approximately 200,000 barrels daily to the unloading potential, although the actual gain will depend upon the success with which the problems of manpower, solid-train movement, etc., are met. Unloading facilities, he said, have acted as a ceiling on the volume of oil which could be moved eastward by rail, and recent efforts of the railroads and ODT to improve the operation of solid trains have bumped up against this ceiling.

Operators Seek Drill Permit At Dorcheat-Macedonia

Oil and gas reserves at Dorcheat and Macedonia and their development featured the April 6 hearing of the Arkansas Oil and Gas Commission when operators asked the commission to make application to PAW for permission to drill wells for oil and gas production in Dorcheat and Macedonia fields.

Conforming to development of Dorcheat and Macedonia reserves, evidence presented verified that oil reserves would exceed by far the gas-condensate reserves should development proceed of mutiple-lease production in the Cotton Valley zone.

Combined reserves as of April 1, 1943, for Dorcheat-Macedonia were given as: Cotton Valley zone oil and gas reserve, 57 million barrels of oil and 112 billion cubic feet of gas; Cotton Valley zone gas-condensate reserve, 7 million barrels of condensate and 90 billion cubic feet of gas. Smackover lime zone gas-condensate reserve, 19 million barrels of condensate and 226 billion cubic feet of gas.

Agreements of royalty owners and operators for the unitization of Dorcheat field were presented to the commission for approval.

Chairman O. C. Bailey asked the various operators to prepare for submission to the commission at the next hearing some remedial measures for eradicating a present salt water hazard at Magnolia field in Columbia County. It was stated this condition is not alarming but might probably constitute a major problem since 13 percent of the liquid produced in that field is salt water.

B. E. Buchanan, district chairman for the gas division of PAW told the Arkansas Oil and Gas Commission that he would recommend development for oil in the Cotton Valley zone in Dorcheat and Macedonia upon assurance it would not impair the supply of gas production.

The commission approved the program for unitization of the Dorcheat field and ordered unitization in effect on April 15.

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U. S. Field Operations

Oklahoma

One Wilcox and One Hunton Field Opened

Stanolind Oil & Gas Company has completed Leonard 1, SW C 10-12-2e, Lincoln County, in First Wilcox sand (Ordovician) for 204 barrels of 37.5-gravity oil and no water. While the discovery is complete without any attempt to penetrate the total sand body, subsequent testing of the entire section is anticipated. It is not believed final definition of the producing area will include much acreage, and per acre productivity may run relatively high. Location of the test was the result of seismic survey.

Garvin County: Ohio Oil Company's Burns 1, SE NE SW 17-3n-2e, which blew out from Pennsylvanian sand at 2876 feet while testing a structure detailed by seismic work, is still wild. Late estimate of the flow is 75,000,000 cubic feet of dry gas. As the week closed, a special crew was attempting to stab in a control.

Oklahoma County: Abe Gutowsky et al's Wagner 1, NWc SW 32-14-4w, 3 miles west of Edmond field, is a pool opener in Hunton lime after plugging back from 7676 feet in dry Second Wilcox sand. Hunton section indicated saturation but no test was made. After the plugback, casing was perforated at 6952-6957 feet and the well immediately began showing mud and oil through 7-inch casing. Testing is incomplete.

Comanche County: Shallow production has been proven at Elgin field where The Texas Company plugged back at Spencer 1, originally drilled to 1103 feet in dry sand. Plug-back depth was 790-812 feet where the well headed 90 barrels in 24 hours through perforations.

Kansas

Three New Pools Indicated; Several Others Showing

Stanolind Oil & Gas Company has completed Van Lieu 1, NE SE NE 20-24-13w, Stafford County, one mile northwest of St. Johns field for 942 barrels potential. When indicated as a producer two weeks ago, the test's proximity to St. Johns production suggested an extension. However, it has been designated the discovery well of Van Lieu pool, producing from Arbuckle at 4079 feet.

Phillips Petroleum Company's Spangenberg 1, C N½ NE SE 21-22-12w, has opened Spangenberg field. The well was completed in Arbuckle dolomite at 3691 to 3697 feet, swabbing 7 barrels per hour on initial test. Falcon-Seaboard Drilling Company is joint owner of the lease.

Saline County: The second field for this county has been proven at Westgae-Greenland Oil Company's Sudendorf 1, NWc SE 30-14-2w, which has been completed in Viola lime at 3222 feet, pumping 124 barrels of 34-gravity oil and 225 barrels of water after treatment with 2000 gallons of acid. The field, to be known as Salina, is 15 miles north of the Lindsborg area, also productive in Viola lime.

McPherson County: Texon Oil & Land Company's Asplund 1, C W½ NE SE 5-17-3w, is extending Lindsborg production north one 40-acre location, with oil from Simpson sand standing in the hole. In the northeast sector of the field, The Carter Oil Company's Carlson 3, C SW NW 7-17-3w, is swabbing in Viola lime at 3416-3427 feet.

Reno County: Fred Koch's Russell 1, SE SE NW 33-22-10w, a wildcat a mile northwest of Peace Creek production, has plugged back after testing Arbuckle lime at 3680 feet for no show. Perforations have been made at 3572-3602 feet in Viola lime saturation, and preparations are being made to treat. Success would mean extension of Peace Creek, which has Viola production.

New Mexico

Lea County Deep Test Has Promise in Ellenburger

Continental - Stanolind and Standard Oil Company of Texas' Tocito 1, C NW SW 17-26n-18w, San Juan County, was coring lime at 6795 feet after experiencing temporary gas blowout at 6665-70 feet in Lower Magdalena of the Pennsylvanian series. Production was mudded off after recovering sample of the gas to be analyzed by the U. S. Bureau of Mines for possible helium content. This prospect is on an 8160-acre block. Continental et al's Bichla-Bi-To 1, NW SW NE 13-30n-21w, is a new wildcat project for the county.

Lea County: R. Olsen Oil Company and Atlantic Refining Company's Langlie 1, east edge of the Langlie field and first try for Ordovician production in county, yielded 7200 feet of clear brackish water from perforations at 9475-95 feet in Ellenburger, topped at 9105 feet. Attempts to make drill-stem test of perforations at 9410-38 feet failed, but perforations at 9110-80 feet yielded 270 feet of oil- and gas-cut mud with tester open 75 minutes. Additional perforations will be made before attempting to acidize. Most promising deep shows were logged in the Clear Fork and Simpson. This prospect is 14 miles north by west of the recent prolific deep strike in the Keystone field, Texas, and also encountered normal section Upper Ordovician (Montoya) and Simpson. Langlie 1 was carrier to granite at 9592 feet.

Guadalupe County: Flynn-Welch & Yates' Moise 1, C SE NW 26-8n-23e, was drilling dry lime 4105 feet.

Ohio Sells Properties In Texas Panhandle

Ohio Oil Company has withdrawn as an oil producer in the Texas Panhandle, having sold its properties to Bell Oil & Gas Company for $75,000 cash. The deal involved 3 leases in Gray and Wheeler counties, aggregating 480 acres with 12 pumpers prorated to base allowable of 82 barrels daily.

West Texas

Keystone Deep Discovery Revealing Heavy Flow

An aggregate of 75,000,000 to 100,000,000 feet of gas and possibly 2400 barrels of distillate daily has been indicated by Amon G. Carter et al's Walton-Pure 2-C, recent deep strike for the Keystone field, Winkler County, in negotiating 190 feet of Ellenburger section to 9405 feet. This discovery has been taking 20-foot cores, then use tester after each run, resulting in prolific gas-distillate flow without including the previously sampled pay. Coring was scheduled to be resumed at 9405 feet after latest drill-stem test at 9388-9405 feet showed in excess of 11,000,000 feet of gas daily accompanied by rated flow of 22 barrels of 58-gravity distillate hourly. Distillate from this zone was of greenish tint to indicate that the improved porosity noted in last core marked the beginning of the oil pay. Operations will be halted upon reaching the oil level to run 7-inch through the gas cap, as open hole prevails below 3642 feet.

Amon Carter's deep project is heralded as a standout discovery involving a major producing area that will extend beyond the field's regular Permian producing area, but terminated sharply on the west flank. Electrical survey confirmed oil saturation revealed by log in Clear Fork at 4640-90 feet and also in Silurian, which registered "kick" at intervals between 7445 to 7885 feet. This survey revised top of Ellenburger call to 9215 feet with elevation of 2955 feet. Bottom-hole pressure was calculated at 4650 pounds in the Upper Ellenburger. The presence of the Clear Fork and Silurian probable pays will incur the use of an extra long intermediate string of pipe on future wells.

Three offsets and nearby tests are slated for the Keystone deep strike. Sid W. Richardson and associates are confronted with two offsets, and one will be started upon the release of the heavy-duty rig used in drilling the discovery. Gulf Oil Corporation, also a ranking lease owner, will drill on its Keystone Cattle Company 26,043-acre leasehold that extends to the south line of the section bearing the discovery. Stanolind Oil & Gas Company has made the strongest bid for protection within and near the producing area, having acquired numerous small tracks in the face of rising prices, and a big lease to the south of the field.

Magnolia Petroleum Company's Walton-State 20, 3 miles west of the Keystone deep well, was drilling lime and shale 10,390 feet in Waddell, Basal Simpson, topped at 10,213 feet with elevation of 2934 feet. The next probable producing zone is the Ellenburger, due near the 10,500-foot level. This wildcat entered the Simpson at 9460 feet, or 1296 feet low to the Keystone prospect, and showed production possibilities in the McKee sand, topped at 9920 feet.

Exploration of the Clear Fork in other Winkler County fields will pre-

cede the launching of more expensive Ordovician tests. American Republic Corporation's Hendrick 4, NE NE SW PSL 45, Block 26, 2890-foot producer in the south portion of the Hendrick field, will be deepened to 5000 feet. Stanolind - Westbrook - Thompson's Hendrick T-67-3-B-1, SWc PSL 33, Block 26, is the deepest having been idle since 1928 with 5 3/16-inch cemented on bottom at 3962 feet.

Deep Tests: Magnolia Petroleum Company's Ralph 1, NEc PSL 20, Block A-38, west Central Andrews County, and 8 miles west by south of the Fullerton field, will be deepened from 6434 feet to explore Clear Fork and possibly deeper zones. In the McCamey field, Upton County, Texas Pacific Coal & Oil Company has been given clearance on necessary pipe to make an Ordovician test of Lane 52-A, GC&SF 5, which was completed through perforations with 9⅝-inch pipe on bottom at 2151 feet.

North Texas

Two Ellenburger Prospects Have Indicated Production

Two Ellenburger prospects in Archer County have indicated production possibilities, and will be cased for production test. Wildcats in Clay and Wilbarger counties encountered nominal shows in Strawn.

G. E. Kadane et al's Ferguson-Conoco 1, midway between Holliday and Mankins, was running liner to try for completion in broken oil pay from Ellenburger section at 5015-5117 feet. This wildcat indicated a small pumper from Strawn. In northeastern Archer County, Tom Medders et al's Fuller 1, C NE SW H&TC 12, Block 1, is to be cased to test broken saturation in Ellenburger at 5342-74 feet. It is separated from Vogtsberger pool by a 5159-foot failure.

Wilbarger County: British-American Oil Producing Company's Wilkinson 1, 6 miles north by east of Harrold, encountered Strawn lime, carrying oil stain and odor, at 4444 feet, and was coring ahead.

Clay County: Continental Oil Company and Omohundro's Stephens 1, projected Ellenburger wildcat 8 miles west by south of Bellevue, logged broken porosity and oil saturation in core at 5204-26 feet, and will core ahead.

Osage County Depleted Gas Sand To Be Used for Storage

The United States Department of the Interior has approved a lease of 1920 acres in Osage County, restricted Indian lands, northern Oklahoma, for use as an underground natural gas storage reservoir. Oklahoma Natural Gas Company will use the acreage, mainly in sections 21, 28, 29 and 32-20n-12e, as an input reservoir in summer when consumer demands are low, against winter peak demands.

Present pressure in the sand is 5 to 6 pounds. The field was originally drilled early in the century and gradually drained of its gas reserve until it is now economically depleted. The formation intended to receive the input gas is shallow. Location of the unit is less than 10 miles northwest of Tulsa.

East Texas

Paluxy-Travis Peak Strikes in Prospect

First Paluxy producing area for Hunt County was in prospect through Stanolind Oil & Gas Company's Tilson 1, NWc of 132½-acre lease, Chas. C. Dale Survey, having yielded 10 percent oil and 90 percent brackish water on swabbing test through perforations at 4358-84 feet. Perforations were squeezed to re-test with favorable outlook for a small well. Electrical survey recorded top of Paluxy at 4370 feet, and oil sand at 4372-84 feet, with elevation of 625 feet. This wildcat logged a thin section of Georgetown, topped at 3966 feet, due to cutting a fault, and entered Goodland lime at 4314 feet. Tilson 1 is 1¼ miles north of the company's Hawks 1, failure in Travis Peak at 65570 feet. The latter entered Paluxy at 4388 feet with elevation of 566 feet.

Franklin County: Tide Water Associated Oil Company and Seaboard Oil Company's Bacon 1, near the center of a 5000-acre solid block and 4 miles north of Scroggins, scored its second probable producing zone in entering Travis Peak oil-saturated sand at 7908 feet. It is credited with an aggregate of 33 feet of possible pay, varying from 7.9 to 16.2 percent in porosity, before reaching shale break at 7966 feet. It was coring at 7988 feet to fulfill contract, calling for 300 feet in the Travis Peak. Analysis of the recovered cores indicated 42-gravity oil. This wildcat passed up probable gas-distillate production in Rodessa at 7279-7304 feet. It is 8 miles northwest of Travis Peak production in the Pittsburg pool, Camp County. Owners apparently will control the productive area, being the first to monopolize a field in the district.

Wood County: Bobby Manziel et al's Bailey-Shell 1, Samuel Burch Survey, and 4 miles southeast of the Coke field, logged adequate porosity and saturation in coring Paluxy to 6361 feet to indicate possible oil production. Electrical survey was pending to determine casing point. First oil saturation was logged at 6216-73 feet. Top of Goodland lime was called at 6185 feet with elevation of 464 feet. This prospect is 6 miles northeast and on a geological strike with the Quitman field.

Quitman Field: Roger Lacy et al's Stone & Johnson 1, H. Anderson Survey, was showing for a 5000-foot northeast extension to the Quitman field, and is preparing to complete through perforations. This outpost entered the Paluxy pay at 6215 feet, with elevation of 446 feet, and logged ample saturation to make a producer in coring to 6382 feet. Pipe was set through the sand.

Smith County: Wickliffe et al's Hackett-Pure 1, projected Travis Peak test for the Sand Flats area, was coring at 7280 feet in Paluxy, topped at 7260 feet. Formation samples yielded fine-grained porous sand with nominal oil odor and stain.

Third Salt-Water System For Kilgore Area

Completion of an additional salt-water-disposal system in the area southwest of Kilgore, shortly, will give the district three outlets for salt water. The East Texas Salt Water Company announced this week that the new system now under construction will serve the west side of the Kilgore area, in the Chism, Holmes and Ryan surveys.

A collection pit has already been built on the Dorcas Wills lease of Selby Oil & Gas Company, and the injection well is being drilled in the P. W. Holmes survey, west of the limits of oil production on the Southern and Thurmond, A. A. King lease.

The system is already 75 percent complete and by the time the well is drilled, the system will be ready to put into operation. With completion of this new installation, all water on the west side of the field opposite the Kilgore area will be returned to the Woodbine reservoir.

Southwest Texas

One Wildcat Produces And Two Are Showing

The Lower Coastal belt and an area in Starr County showed a high discovery record within the past week with one wildcat completed as a field opener and with two other wildcats definitely showing for new discoveries. These new developments take part of the development spotlight away from Wilcox development in Karnes, Bee and DeWitt counties where leasing and blocking has been brisk preparatory to drilling of more wildcats soon. Also increasing interest in a real development is a major extension to the prolific Agua Dulce field in Nueces County and the starting of the deepest wildcat ever drilled in Starr County.

Jim Wells County: Humble Oil & Refining Company is opening a new oil field northeast of Magnolia City field with Evetts 1 recovering 400 feet of 29-gravity oil in 17 minutes on a drill-stem test at 4278-85 feet. Operators previously made a similar test at 4200 feet but this attempt failed when the seat slipped. Another test was at 4137-45 feet —yielded 65 pounds working pressure and a gas blow of 2,000,000 cubic feet daily through ¼-inch and ⅜-inch chokes with bottom-hole pressure of 1390 pounds.

Slated to be drilled to 6000 feet, the discovery is located in the southwest corner of the south 320-acre tract of Roberts and White subdivision of McIntyre tract in Marcelino Lopez grant. It is one mile northeast of Kirkwood and Morgan's Cummins 1 dry hole.

Starr County: Potential gauge has been run on a discovery in south portion of the county 10 miles north of Rio Grande City and 4 miles northeast of Los Almos field. The wildcat, drilled originally by Ike Howeth as Caffarelli 1, is known as Lockhart and Davenport's Caffarelli 1. With pay sand topped at 3620 feet, probably in the Yegua or Pettus, hole was drilled to 3630 feet and 5½-inch casing set to 3609 feet. On test run the discovery flowed 77 barrels of 46.6-gravity oil daily through ⅛-inch choke with a gas-oil ratio of 78-1, tubing pressure 300 pounds and casing 880 pounds. A sand at 1552-58 feet carried oil odor. The discovery is on a Humble farmout, 660 feet from the south and west lines of share 19-C, J. A. de la Garza Falcon grant, porcion 80.

LaSalle County: Quintana Petroleum Corporation apparently is opening a

new field in southeast part of the county with South Texas Syndicate 1-D flowing 4 barrels of 48-gravity oil with 4,000,000-cubic feet of gas daily through ¼-inch choke. The tubing pressure rose to 1300 pounds, casing sealed. Perforations were made at 6030-35 feet in Wilcox sand after drilling to 7115 feet and setting 5½-inch casing to 6104 feet. This discovery is in E½ SW H&GN 8, 14 miles south of Fowlerton, and is 5 miles southwest of the company's gas discovery at Green Branch.

Nueces County: Hiawatha Oil & Gas Company has completed a ½ mile southwest extension in the 7100-foot pay section on southeast flank of Agua Dulce field. The company's Dryden 1 was perforated at 7120-24 feet and flowed 125 barrels of clean oil daily through ⅛-inch choke with 1100 pounds pressure on tubing and 1300 pounds on casing. Oil sand was found at 7118-25 feet and hole was drilled to 7165 feet with 5½-inch casing set on bottom. Location is in northeast corner of the west 240-acre tract in north half of Section 192, Bishop Palo Alto subdivision.

Calhoun County: Stanolind Oil & Gas Company has given a major southwest extension to the Jay Welder or Duck Bay field with Welder 7-B flowing 152 barrels of oil daily through ⅛-inch choke from perforations at 5648-49 feet. Sand was topped at 5644 feet and the hole was drilled to 5651 feet. This extension is ½ mile from an old well.

Wildcat: Sun Oil Company is preparing to drill a projected 11,500-foot wildcat on Sun field structure in Starr County, northeast part of county. Well is McKinney 13 and it is 1980 feet out of southwest corner of A. J. Smith Survey 240 on 625-acre portion of 2560-acre tract. The well will be the deepest ever drilled in the area if the objective is reached.

Texas Gulf Coast

Second Oil Producer Looms for Katy Field

Humble Oil & Refining Company has been making a squeeze job in Hebert 1, 4000 feet east of Stanolind Oil & Gas Company's Pattison 1 oil discovery on northeast side of Katy field, Harris and Waller counties. Last perforations were made around 6854 feet but some water channeled into the flow necessitating squeezing. The well flowed 73 barrels of oil in 19 hours on drill-stem test through 3/16-inch and ¼-inch chokes. The well is in H&TC 113. Total depth is 7185 feet with top of cement at 6867 feet.

Matagorda County: Superior Oil Company has finished a fishing job in Peterson 1, wildcat in Sugar Valley area that blew out from 10,702 feet. Operators have cleaned up the hole, ran electrical survey, and now are preparing to sidetrack around 10,407 feet to redrill the sands that attempted to blow out.

Galveston County: Stanolind Oil & Gas is completing an outpost at Alta Loma. Hulen 8 is bottomed at 9182 feet in sand and 5-inch liner is set to 9181 feet. The well is being completed in one-foot open hole at the bottom. The well is on west side of the field.

Old Ocean: Abercrombie Oil Company and Magnolia Petroleum Company have requested a permit to dual complete the deepest well in Texas, McDonald 1-B, at Old Ocean in Brazoria County. The well was projected to 15,250 feet, but the objective was not reached by a few hundred feet. Several sands were reported below the 12,000-foot horizon, but details on the shows have not been announced.

South Louisiana

Acadia Parish Wildcat Shows Probable Production

Sun Oil Company is preparing to perforate and make a production test on Daily 1, 31-9s-1w, wildcat on the Egan, Acadia Parish, prospect. Hole was drilled to 10,871 feet and 7-inch casing is set on bottom. Several interesting sands were encountered and that the well attempted to "kick" although heavy mud was being used. It has not been announced what sand level will first be tested.

Beauregard Parish: General Crude Oil Company is running potential test on Baldwin 1, wildcat discovery of the Bear field. So far, this discovery in the basal Frio sand looks like the best of the year. First perforations at 6512-24 feet yielded considerable fluid with part of the flow being water. These holes were squeezed and new shots made at 6512-20 feet, and on a preliminary test the well produced estimated 7 barrels of oil hourly, no water, through ⅛-inch choke with 950 pounds pressure on tubing and 950 pounds on casing.

North Louisiana

Caddo Parish Wildcat Testing Pettit Oil Show

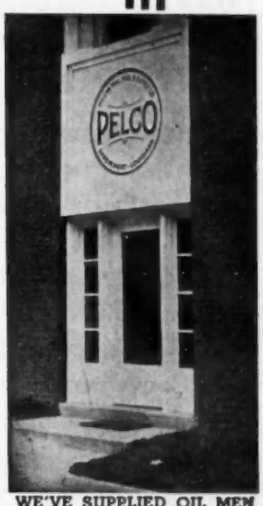
Harris & Owens' wildcat, Fuller 1, SE NE 4-22n-15w, Caddo Parish, was trying for production from upper Pettit lime at 5804-55 feet. Operators used acid in Pettit lime and the test was swabbing and flowing 10 barrels per hour, 75 percent oil, casing was put down to 6255 feet in Travis Peak and the hole plugged back to test lower Pettit lime at 5888-5920 feet. Lower Pettit section showed oil but later tests turned to salt water.

Bossier Parish: A north edge well at recently discovered North Carterville, Hunt Oil Company's Nebo 3, NE NW 3-23n-12w, will have flow valves installed for production gauge from Pettit lime at 6116-38 feet. Acid has been used in Pettit lime after pipe was perforated at 6116-38 feet. Although no dry holes have been drilled in the immediate area of North Carterville, which now has three wells on production, Pettit lime along this trend is not considered as porous as the Pettit lime found at Haynesville 14 miles east.

Claiborne Parish: Skelly-Sunray's Wallace-Griffis 1, SE NE 36-20n-7e, set 5½-inch pipe to 6460 feet in Travis Peak, after recovering gas, mud and a show of distillate in a drill-stem test at 6380-99 feet. A 6-mile 4-inch line is being laid to take gas production from Willace-Griffis 1 and the discovery, Skelly-Sunray's Volentine 1, NW NW

They Plan It That Way!

Crackpots, pinks and pressure groups habitually deluge Washington with letters and telegrams. It must be difficult, sometimes, for senators and representatives to know what real Americans do want. Why don't you and I be more articulate? Why don't we raise hell, for instance, about that Corinthian dream the National Resources Planning Board has drug in? Maybe you don't TRY PELCO FIRST — maybe you don't even want to TRY PELCO FIRST. But that 35-year-old privilege is perhaps the least of the liberties you can lose in the marijuana smoke of that NRPB pipe dream.



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31-20n-6w, to Arkansas-Louisiana's 20-inch line southeast of Athens. The discovery has been shut in since March, 1940, after testing 10,000,000 feet of gas.

Eight miles east of Athens at the southeast edge of Sugar Creek, Roy Lee, Trustee's Byrd 1, SE NW 17-19n-5w, found Ozley pay in Travis Peak more than 200 feet high. Byrd 1, during a 24-hour period flowed 1192 barrels of 33-gravity oil from perforations at 5579-88 feet. This is the second test to find production on the upthrow side of a recently discovered fault in this section of the field. White & Hinton's Byrd 1, NE NE 18-19n-5w, cut the fault and found gas production from a sand at 5802-18 feet which correlated with a pay oil sand found at 6066-88 feet on the downthrow side of the fault. This fault line is believed to run in a southwest-northeast direction. Six new tests are in the process of going down on the upthrow side of this fault. Sugar Creek proper is an anticlinal dome and is known to have numerous faults.

Gulf Refining Company's deep wildcat, Miller 1, NE NE 14-20n-8w, 4 miles south of Homer field, failed to show commercially in Pettit lime or Cotton Valley horizons. Pettit lime failed in interval 6608-60 feet and tests in Cotton Valley at 10,470 feet extending to 10,610 feet had previously tested negative. Operators believed distillate production a possibility when core tests in Cotton Valley at 10,469-476 feet revealed gas-distillate show and 6-inch pipe was set at 10,731 feet. Total depth is 10,761 feet.

Bienville Parish: Placid Oil Company's discovery near Lucky, Nebo A-1, SW NE 11-15n-7w, has been officially gauged at 24,000,000 feet of gas per day with slight spray of distillate which is ungauged, flowing from Pettit lime. Pipe was set to 6800 feet. Drilling stopped at 7804 feet. Same operators have two offsets drilling. This new area is five miles southwest of Bear Creek Pettit lime gas production.

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California

Increase Crude Price Attracts More Drilling

Highest prices in years for low-gravity oil are bringing back to California oil fields many small operators long absent from the drilling scene. Heretofore, in recent years, lack of demand and low prices had driven them away from the shallow fields yielding this type of oil.

San Joaquin Valley fields are in highest favor with those joining the search for new heavy-oil production. In the first place the new price schedule favors most the fields of that section, and also risks of outpost drilling there are less than in any other part of the state.

One of the minor companies who got an early start with its shallow drilling campaign completed 50 of these wells in 200 days, adding 1600 barrels to its daily production. A larger organization boosted its daily output considerably with a rehabilitation program involving the return to production of 200 strippers that had been shut in about 15 years.

Drilling contractors this week reported California bookings showed a quick increase after posting of the new schedules, but they believe it will not be possible to get a line on over-all drilling activity increase until PAW makes the anticipated announcement of relaxed spacing regulations for heavy-oil fields.

E. W. RICKEY has joined Geologic Standards Company as field engineer with headquarters at Garnett, Kansas, where the company has recently opened an office. He was formerly laboratory technician for Shell Oil Company at Tulsa.

Michigan

Cedar Discovery Well Reworked for Better Flow

Ohio Oil Company's Zimmerman 1, S½ NE SE 28-18n-9w, Cedar field discovery, Osceola County, flowed 540 barrels of oil in 14 hours through ¾-inch choke, with 290 pounds tubing pressure after 500-gallon acid treatment. This well originally was completed February 24, 1943, for 610 barrels initial but production had fallen to about 160 barrels per day. Five tests are drilling in the district.

Lake County: Oil Producers, Inc.'s Woods 1, NE SE SE 24-18n-12w, wildcat, after drilling Traverse and Dundee horizons dry, is being deepened to approximately 4500 feet to test Richfield section of Monroe.

Barry County: Southwest Development Company will plug back from 2176 feet to test oil shows between 1800-2000 feet in Traverse and Dundee section at Rankin 1, N½ NW SE 19-1n-7w, Assyria Township wildcat.

Rocky Mountain States

Steamboat Discovery Swabs 27 Barrels Hour

British American Oil Producing Company's Tribal 1-E, NE NW NW 5-3n-1w, Fremont County, Wyoming, swabbed 60 barrels the first hour and averaged 27 barrels per hour in 24 hours and is continuing production test. This wildcat is on the Steamboat Butte structure, a local high on the northwest extremity, three miles northwest of British American and Superior Oil Company's Tensleep discovery at Pilot. The Steamboat test, however, developed production in the Sundance at 5091-5119 feet. Despite the Sundance running approximately 1000 ft higher at Pilot Butte proper than at Steamboat, the Sundance at Pilot is water bearing. The Steamboat well is to the north and on the upthrow side of fault which transverses the axis of the structure and apparently explains the anomaly.

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To win America's "Battle of Production" more and more defense manufacturers are replacing less efficient types of bearing metals with BRONZOID. Its outstanding performance record gives positive insurance against costly breakdowns, expensive repairs.
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FOUNDERS · MANUFACTURERS · MACHINISTS
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United States Well Completions

ARKANSAS

Columbia County — Stephens-Smart: R. H. Crow, Trustee's Guttrey A-1, sw sw ne 11-15s-20w, elev 229 ft, pump 199.2 bbls, perf Tokio 2462-74 ft, 5½-in 2536 ft, td 2550 ft.

Grady H. Vaughn's Taylor 1, se nw 12-15s-20w, pump 200 bbls, 4100 ft.

Lion's Stocks 1, se se 10-15s-20w, perf Tokio 2537-41, oil, no gauge, 2572 ft.

ARKANSAS WILDCATS

Calhoun County: Placid Oil Co.'s Freeman-Smith 4, ne nw 2-15s-14w, abnd 4423 ft.

Cleveland County—Failure: Talco Asphalt & Refining Co.'s McGehee 1, ne se 27-10s-11w, abnd 3719 ft.

CALIFORNIA

Fresno County — Coalinga Old Field: General's Esperanza 111, se ne sw 6-20-15, pump 54 bbls oil, 18 water, 132 ft perf 1758 ft, td 1759 ft.

Shell's 107-29, sw sw 29-19-15, pump 30 bbls, perf 1790-1778, 1758-1657, 1607-1557, 1506-1467, 1442-1411, 1342-1312, 1282-1168 ft, black shale 1453 ft, Kreyenhagen 1802 ft, td 1808 ft.

Shell's 171-2, ne ne ne 2-20-15, pump 214 bbls, perf 3630-3562, 3531-3501, 3481-3446, 3426-3286 ft, td 3632 ft.

Kern County—Belridge North: Belridge Oil Co.'s 27-Y-27, sw se nw 27-27-20, flow 200 bbls 32-gr, 200,000 cu ft gas, 16/64-in, 300/1750 lbs, 119 ft perf 8940 ft, Y sand 8820 ft, td 8940 ft.

Kern County—Belridge South: General's Belridge 23-2, se nw nw 2-20-21, pump 64 bbls 16.9-gr, perf 520-641, 681-751, 800-875 ft, td 894 ft.

General's Belridge 34-12, nw sw ne 12-29-21, pump 50 bbls 13.4-gr oil, 12 water, 172 ft perf 1059 ft, oil sand 890 ft, td 1080 ft.

Kern County—Greeley: Standard's KCL 11-36, ne sw nw 20-29-26, flow 946 bbls 38.3-gr, 16/64-in, 1150/1175 lbs, 52 ft perf 11,513 ft, oil sand 11,506 ft, base Grit 11,450 ft, Vedder 11,510 ft, td 11,514 ft.

Kern County—Kern Front: Standard's 38, nw se ne 15-28-27, pump 61 bbls 14.1-gr oil, 3 water, 33 ft perf, "M" 1892 ft, "N" 1999 ft, "R" 2099 ft, "S" 2130 ft, td 2290 ft.

Kern County—Midway-Sunset: H & T Oil Co.'s 8, nw nw nw 13-31-22, pump 40 bbls 13-gr oil, 14 water, 424 ft perf 1095 ft, td 1132 ft, pd 1095 ft.

Standard's 5-29D, sw sw nw 29-32-24, pump 42 bbls 25.5-gr oil, 3 water, 6⅝-in 2345 ft, Reef Ridge 2604 ft, td 3048 ft, pd 2350 ft.

Union's Midway-Northern 4, sw sw sw 7-11-23, pump 372 bbls, perf 1742-1862 ft, 1862 ft, oil sand 1744 ft, td 1863 ft.

Kern County—Mount Poso: Ring Oil Co.'s Bowles 16, ne sw 29-26-28, pump 100 bbls 16-gr, 26 ft perf 1699 ft, Vedder 1677 ft, td 1699 ft.

Kern County—Round Mountain: Honolulu Oil Corp.'s 53, se se ne 18-28-29, pump 48 bbls 16.2-gr, 57 ft perf 2004 ft, Vedder 1946 ft, Grit 1925 ft, td 2084 ft, pd 2005 ft.

Kern County — Williams Antelope Hills: Shell's Williams 76-6, sw ne se 6-28-20, flow 292 bbls, 22/64-in, 100/130 lbs, 160 ft perf 2495 ft, 23-6 sand 2130 ft, 45-6 sand 2335 ft, td 2500 ft.

Los Angeles County—Puente Hills Discovery: Barry Oil Co.'s Billy Rowland 1, ne sw sw 14-2-10, pump 155 bbls rate on 5-hr gauge, 20.5-gr, 41 ft perf 2423 ft, td 2423 ft.

Los Angeles County—Wilmington: General's Isco A-1, 212 sely along bndry E. Basin fr nely cor & 285 ft ne at r/a, pump 76 bbls 14.8-gr oil, 11 water, perf 2644-2923, 2955-3100, 3130-3300, 3330-3449 ft, old depth 3550 ft, redrilled to 3450 ft.

Long Beach Oil Development Co.'s W 46, 564 ft nely along n line Seaside Blvd fr e side 27th Ave thence 2191 ft sely at r/a, pump 270 bbls 15.1-gr oil, 12 water, perf 2964-3114, 3159-3252 ft, td 3307 ft, pd 3258 ft.

Long Beach Oil Development Co.'s "X" 14, 619 ft s 854 w of point 61.54 ft swly along n linr Seaside fr intersec w side Santa Barbara Ave, flow 240 bbls 15.3-gr, perf 2054-2332 ft, tar sand zone, td 2237 ft.

Orange County—Huntington Beach: Signal Oil & Gas Co.'s Bolsa 43-A, 2513 ft n 1730 ft w fr swc plot "C" Standard's Bolsa lease, pump, no set, 682 ft perf 4706 ft, td 4900 ft.

Orange County—Yorba Linda: Shell's Olinda Fee 4, 66-16, 2871 ft n 1604 ft w c/l Citrus & Eureka, flow 454 bbls 19.1-gr, perf 2222-2129 ft, 2060-1994 ft, 1-in, 50/500 lbs, td 2225 ft.

Shell's Olinda Fee 4, 57-16, 2499 ft n 2298 ft w c/l Citrus & Eureka Aves, pump 427 bbls, 134 ft perf 2441 ft, td 2540 ft.

Sacramento County—Rio Vista: Amerada's Kuhn Comm. 2, 28-4-3, dry gas, shut in without est, perf 4250-4270, 4125-4230, 4070-4110 ft, td 4300 ft.

Ventura County—Ventura Avenue: Shell's Taylor 83, Ventura Avenue, flow 550 bbls open flow, 70/240 lbs, perf 5947-5904, 5887-5116 ft, td 5950 ft.

CALIFORNIA WILDCATS

Butte County—Failure: Pacific Western Oil Co. and George F. Getty's Cana 1, sw 11-23-1, Cana area, abnd 3969 ft.

Kern County—Failure: Texas Co.'s Bowerbank 6-C, ne sw 6-29-24, Bowerbank area, Mulinia zone 4660 ft, abnd 4950 ft.

Kern County—Failure: Tide Water Associated's 32-17, sw ne nw 17-30-26, seeking Strand East extension, abnd 8400 ft.

Orange County—Failure: Signal Oil & Gas Co.'s Irvine Beach 1, 6-7-9, Corona del Mar area, abnd 1900 ft.

Orange County—Failure: Texas Co.'s Buena Park Unit 5-J-1, 31-3-10, Buena Park area, abnd 9577 ft.

COLORADO

Rio Blanco County — Rangely: California Oil Group, Ltd.'s McLaughlin 1, nw sw 32-2n-102w, pump 50 bbls, fractured zone Mancos shale, 710 ft.

ILLINOIS

Clay County: Tide Water's Winka 1, c sw sw 13-3n-6e, McCl 2971-86 ft, 148 bbls, 2990 ft.

Stanolind's Riggle 1, c w½ nw sw 24-3n-6e, abnd 3021 ft.

Gulf's Edgewood Pump Station 1, sw sw se 10-5n-5e, abnd 2511 ft.

Central PL Co.'s Reed 2, sw nw nw 14-5n-5e, Weiler 2132-46 ft, 106 bbls, 2146 ft.

Luttrell et al's Reed Heirs 2-A, sw nw ne 15-5n-5e, Ben 2277-2311 ft, Aux V 2323-58 ft, 165 bbls, 2380 ft.

Shell's Leonard Comm. 1, c ne ne sw 15-5n-5e, Aux V 2310-36 ft, 94 bbls, 2372 ft.

Texas Co.'s Kidwell 7, c se nw 15-5n-5e, Aux V 2324-42 ft, Ben 2266-84 ft, 93 bbls, 2342 ft.

Tide Water's Davis 4, c nw se ne 15-5n-5e, Weiler 2124-39 ft, Ben 2282-2306 ft, Aux V 2337-50 ft, 120 bbls, 2350 ft.

Tide Water's Davis 5, c ne se ne 15-5n-5e, Cyp sand 2124-38 ft, Ben 2284-2300 ft, Aux V 2337-2350 ft, 200 bbls, 2350 ft.

Clinton County: Texas Co.'s Ward 3, c ne ne 2-2n-2w, Dev 2670-2671½ ft, 164 bbls, 2671½ ft.

Edwards County: Nelson Develop. Co.'s Bunting 1, c se sw nw 8-2s-10e, abnd 3447 ft.

Effingham County: W. R. Braun's Trimble 2, c ne nw sw 26-6n-5e, abnd 2463 ft.

Walter Duncan's Brink 1, c se sw sw 34-6n-7e, Weiler 2534-39 ft, 21 bbls, 2539 ft.

Gallatin County: Gulf's Bahl 4, c sw ne sw 15-8s-9e, Cyp sand 2482-97 ft, Tar Spgs 2158-93 ft, 69 bbls, 2497 ft.

Hamilton County: Texas Co.'s Smith 3, c nw sw ne 24-6s-5e, Aux V 3124-50 ft, 88 bbls, 3152 ft.

Gulf's Parks 1, c ne se sw 35-6s-5e, Aux V 3260-66 ft, 72 bbls, 3270 ft.

Texas Co.'s Sircks 1, c se se sw 18-6s-7e, Aux V 3053-90 ft, 98 bbls, 3090 ft.

Jasper County: Standard Drlg. Co.'s Poehler 2, c e½ nw nw 7-5n-10e, abnd 2897 ft.

Jefferson County: E. J. Ruwaldt's Ryski 3, ne nw nw 35-2s-1e, Ben 1986-1994 ft, 130 bbls, 1997 ft.

E. J. Ruwaldt's Rynski 4, nw nw nw 35-2s-1e, temp abnd.

C. F. Frazier's B. Buckley 1, n½ sw se 27-3s-4e, abnd 3199 ft.

Lawrence County: Smith & Nye's Catt 5, c e½ e½ sw 23-2n-12w, Biehl 1299-1400 ft, 175 bbls, 1400 ft.

Richland County: Pure's Coen 36, 40 ft n of csl se 4-3n-9e, Weiler 2586-94 ft, 159 bbls, 2650 ft.

Wabash County: Skiles et al's Murry & Burkett 1, c se se se 34-1n-13w, Palestine 1781-1800 ft, 70 bbls, 1805 ft.

Wayne County: Pure's Lowe 1, c sw nw sw 8-1s-6e, Aux V 3043-59 ft, 17 bbls, 3060 ft.

Pure's Barnard A-1, ne nw nw 17-1s-6e, Aux V 3013-40 ft, 211 bbls, 3040 ft.

Pure's Talbert 2, ne nw ne 17-1s-6e, 350 bbls, 3040 ft.

White County: Superior's Speck 3, c nw nw sw 31-4s-14w, Deg 2020-45 ft, Tar Spgs 2354-60 ft, 60 bbls, 2360 ft.

Superior's Greathouse 11, c sw se ne 4-5s-14w, Cyp sand 2580-2600 ft, Ben 2705-2725 ft, 135 bbls, 2725 ft.

Sun's Gardner 13, c nw se nw 6-5s-11e, Tar Spgs 2299-2330 ft, 316 bbls, 2330 ft.

ILLIONIS WELL DEEPENED

White County: Pure and Carter's Neel 2, sw ne ne 18-6s-9e, otd 2800 ft, 123 bbls.

ILLINOIS WILDCATS

Christian County—Discovery: Mid-Ill Pet. Co.'s Charles Ralph 1, c se ne ne 27-15n-2w, Dev 1897-1901 ft, 22 bbls, 1905 ft.

Clinton County—Failure: H. A. Cotton's Billhartz 2, c s½ ne se 22-1n-5w, abnd 1256 ft.

William Murphy's Becker 1, c sw ne se 18-1n-3w, abnd 1098 ft.

Cumberland County—Failure: Papoose Oil Co.'s Curry 1, c nw nw nw 3-10n-7e, abnd 2246 ft.

Franklin County—Discovery: Seaboard's U. S. Coal & Coke 8, c ne ne 26-6s-4e, Aux V 3122-28 ft, 275 bbls, 3132 ft.

Marion County—Failure: Seaboard Oil Co.'s Kniseley 1, c ne se se 18-3n-4e, abnd 2627½ ft.

Perry County—Failure: Texas Co.'s Mat-

Wells Completed in the United States in Week Ended April 10, 1943

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS						WILDCAT COMPLETIONS				ALL COMPLETIONS			
	New Wells					Old Wells Deepened							Cumulative	
	*Oil	Gas	†Input	Dry	Total		*Oil	Gas	Dry	Total	This Week	Last Week	This Year	Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Arkansas	3	....	....	....	3	....	....	....	1	1	4	....	43	58
California	20	2	....	....	22	1	....	....	5	5	28	31	373	242
Colorado	1	....	....	....	1	....	....	....	....	....	1	2	6	4
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Illinois	23	....	....	7	30	1	2	....	8	10	41	25	542	535
Indiana	....	....	....	....	....	....	1	....	1	2	2	7	82	111
Kansas	14	1	....	6	21	1	2	....	8	10	32	32	406	459
Kentucky	....	....	....	1	1	....	....	....	....	....	1	9	76	46
Louisiana	2	....	....	5	7	....	....	....	3	3	10	4	145	317
North Louisiana	1	....	....	1	2	....	....	....	3	3	5	....	57	.....
South Louisiana	1	....	....	4	5	....	....	....	....	....	5	4	88	.....
Michigan	5	1	....	4	10	1	....	....	2	2	13	11	127	196
Mississippi	1	....	....	....	1	....	....	....	1	1	2	....	8	48
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	3	9
Montana	2	....	....	....	2	....	....	....	....	....	2	18	58	43
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	....	15
New Mexico	2	1	....	....	3	....	....	....	4	4	7	8	75	121
New York	13	....	6	1	20	....	....	....	....	....	20	18	316	346
Ohio	1	8	....	5	14	....	....	....	....	....	14	16	244	354
Oklahoma	9	2	1	7	19	3	....	....	8	8	30	33	386	488
Pennsylvania	39	2	....	....	41	....	....	....	....	....	41	41	701	1,025
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	1	3
Texas	40	3	....	11	54	6	3	....	18	21	81	54	1,030	2,123
E.T.BorderCo.'s	....	....	....	....	....	....	....	....	....	....	....	....	5	.....
East Texas Field	....	....	....	....	....	....	....	....	....	....	....	....	2	.....
Rest of E. Texas	2	....	....	2	4	....	....	....	3	3	7	4	58	.....
North Texas	9	....	....	4	13	....	....	....	7	7	20	9	240	.....
West Central	1	....	....	3	4	....	....	....	3	3	7	8	85	.....
West Texas	10	....	....	2	12	6	....	....	3	3	21	15	239	.....
Panhandle	3	1	....	....	4	....	....	....	....	....	4	....	67	.....
Upper Coast	1	1	....	....	2	....	3	....	....	3	5	4	69	.....
Lower Coast	14	1	....	....	15	....	....	....	1	1	16	5	147	.....
Southwest	....	....	....	....	....	....	....	....	1	1	1	8	98	.....
South Central	....	....	....	....	....	....	....	....	....	....	....	1	20	.....
West Virginia	8	6	....	....	14	....	....	....	....	....	14	13	171	211
Wyoming	3	....	....	2	5	....	....	....	....	....	5	5	40	29
Total U. S.	186	26	7	49	268	13	8	....	59	67	348	327	4,833	6,787

* Includes distillate wells. † Includes salt water disposal wells.

lavish 1, c nw sw ne 36-4s-2w, abnd 4121 ft.

Wabash County—Failure: Sinclair-Wyoming's Strasser 2, c sw sw nw 3-2s-13w, abnd 2792 ft.

Wayne County—Failure: Pure's Atteberry B-1, c ne se nw 1-1s-7e, abnd 3320 ft.

Duncan, Inc.'s Beck Comm. 1, c se ne 5-1s-7e, abnd 3337 ft.

INDIANA WILDCATS

Jennings County—Failure: Ohio Valley Oil Co.'s Phillips 1, se ne nw 30-7n-8e, abnd 1537 ft.

Knox County—Discovery: Sinclair-Wyoming & Bauer's Brevoort 1, sw nw sw 11-2n-11w, McCl 1859-63 ft, 105 bbls, 1867 ft.

KANSAS

Barton County—Kraft Prusa: Texas Co.'s Burmeister B-3, c sw se 2-17s-11w, Arb 3372 ft, pump 527 bbls, 3386 ft.

Gulf's Staudinger 2, se sw se 7-16s-11w, Arb 3259 ft, 1000 gal acid, pump 112 bbls, 3263 ft.

Hinkle Oil Co.'s Kroutwurst 2, c sw se 34-16s-11w, Arb 3394 ft, abnd 3406 ft.

Butler County—Eldorado: Harry Wilson's Robinson 1, c w½ nw se 17-25s-5e, Miss 2543 ft, pump 144 bbls, 2569 ft.

Cowley County—David: Aylward Prod. Co.'s Hanlen 4, se sw se 26-30s-4e, Bartles 2950 ft, shot 40 qts, pump 35 bbls, 2967 ft.

Dickenson County—Lost Springs: Bob Youker's Martin 1, nw se sw 34-16s-4e, Miss 2269 ft, pump 128 bbls oil, 12 wtr, 2337 ft.

Ellis County—Bemis: Gulf's Thurston 1, c sw ne 18-11s-16w, Arb 3328 ft, abnd 3334 ft.

Ellsworth County—Stoltenberg: Magnolia's Wamhoff 1, c sw ne 26-16s-10w, Arb 3392 ft, abnd 3430 ft.

Kearny County—Hugoton: Kansas Nat'l Gas Co.'s Frost 1, c 5-25s-35w, Ft. Riley 2455 ft, pay 2510-18 ft, 10,000 gal acid, 25,335,000 gas, 2652 ft.

Leavenworth County—McLouth: Magnolia's Jeannin 1, c ne nw 7-10s-21e, McL sand 1386-1412 ft, pay 1386 ft, shot 40 qts, pump 18 bbls, 1414 ft.

Marion County — Lost Springs: Westgate-Greenland's Williams 2, c sw se 4-17s-4e, Miss Chat 2312 ft, pump 50 bbls, 2339 ft.

Ring-Mac Oil Co.'s Kaiser 4, c w½ se se 33-17s-4e, Miss chat 2367½ ft, pump 35 bbls, 2387 ft.

Larieux & Harrington's Honska 2, c nw ne 5-18s-4e, Miss 2391 ft, pb to 2418 ft, pump 40 bbls oil, 1 wtr, 2437 ft.

McPherson County—Lindsborg: Dickey Oil Co.'s Frantz 1, c w½ se se 24-17s-4w, Viola 3381 ft, 3500 gal acid, pump 441 bbls, 3387 ft.

McPherson County — SW Lindsborg: Auto Ordnance's Bengstrom 5, c w½ sw ne 25-17s-4w, Viola 3384 ft, pb to 3389½ ft, 1800 gal acid, 1742 bbls, 3394 ft.

Auto Ordnance's Bean 3, c w½ nw ne 36-17s-4w, Viola 3389 ft, 3300 gal acid, pump 561 bbls, 3397 ft.

Pratt County—Unnamed: Skelly's Knopp B-2, sw se se 25-26s-13w, Arb 4313 ft, 2750 gal acid, 3000 bbls, 4325 ft.

Rice County—Hafferman: Duwe & Farris' Wiens 2, e½ nw ne 6-19s-9w, Arb 3292 ft, abnd 3298 ft.

Rice County—Chase: Aylward Prod. Co.'s Rolfs 1, c sw nw 20-19s-9w, Arb 3226 ft, 1000 gal acid, 1794 bbls, 3242 ft.

Stafford County—Curtis: Vickers & McMorrow's Curtis 2, c s½ se nw 6-22s-13w, Viola 3711 ft, abnd 3720 ft.

Sumner County—W. Oxford: B. B. Blair and Summit Drlg. Co.'s Barnes 2, nw sw ne 17-32s-2e, Lans 2797 ft, abnd 3011 ft.

KANSAS WELL DEEPENED

Butler County—Stern: H & M Drlg. Co.'s Tabing 1, se sw se 21-27s-6e, otd 2725 ft, Simp sand 3028 ft, 1500 gal acid, pump 50 bbls, 3030 ft.

KANSAS

Barton County—Failure: Three Way Drlg. Co.'s Haun 1, se c 7-16s-14w, Anhy 940 ft, B. Oread 3178 ft, Lans 3221 ft, Congl 3447 ft, Arb 3485 ft, abnd 3520 ft.

Champlin's Newkirk 1, ne ne ne 28-20s-14w, Anhy 845 ft, Lans 3302 ft, Congl 3540 ft, Simp 3650 ft, Arb 3570 ft, abnd 3583 ft.

Decatur County — Failure: Helmerich & Payne's Harge 1, se se ne 29-1s-27w, Anhy 1962 ft, Topeka 3126 ft, Lans 3273 ft, Base KC 3483 ft, sdy Congl 3615 ft, Gran Wash 3648 ft, Gran 3683 ft, abnd 3688 ft.

McPherson County — Failure: Falcon-Seaboard's Krehbiel 1, ne ne ne 35-19s-4w, Lans 2570 ft, Miss 3248 ft, B Miss 3469 ft, Maq 3684 ft, Viola 3741 ft, Simp sdy dolo 3763 ft, Arb 3836 ft, abnd 3886 ft.

Phillips County — Failure: Northern Ordnance's Ruys 1, c se se 23-3s-20w, B Ft Hays 445 ft, Dakota 850 ft, Anhy 1778 ft, Topeka 3149 ft, Lans 3370 ft, Marm 3597 ft, Arb 3690 ft, abnd 3743 ft.

Russell County — Failure: Tom Palmer's Butcher 1, se ne sw 21-12s-15w, Anhy 887 ft, Lans 2964 ft, Congl 3267 ft, abnd 3347 ft.

Cities Service's Hilgenberg 1, se sw nw 16-15s-11w, KC 2879 ft, Congl 3197 ft, Arb 3249 ft, abnd 3280 ft.

Saline County—Discovery: Westgate-Greenland's Sudendorf 1, nw nw se 30-14s-2w, Miss 2665 ft, B Miss 2923 ft, Hunton 3052 ft, B Hunton 3153 ft, Viola 3222½ ft, 2000 gal acid, 125 bbls oil 225 wtr, 3232 ft.

Stafford County — Failure: Cities Service's Demerell 1, c ne sw 11-25s-15w, Topeka 3132 ft, KC 3767 ft, Base KC 4070 ft, pb 3977 ft, 4000 gal acid, pb 3932 ft, abnd 4085 ft.

Stafford County—Discovery: Cities Service's Grunder 1, sw ne ne 11-25s-15w, Topeka 3140 ft, Lans 3780 ft, pay 3917 ft, B KC 4100 ft, Congl 4184 ft, Kinderhook 4226 ft, Viola 4311 ft, Arb 4455 ft, pb 4050 ft, 13,000 gal acid, pump 46 bbls 60% wtr, 4500 ft.

KENTUCKY

Daviess County: Hupp et al's L. Hagen 1, 12-P-27, abnd 1983 ft.

NORTH LOUISIANA

LaSalle Parish—Nebo Hemphill: Hunt Oil Co.'s Goodpine A-47, sw sw 15-7n-3e, flow 175 bbls, perf 4046-50 ft, td 4132 ft.

Placid Oil Co.'s Taylor 1, ne nw se 40-7n-3e, abnd 4212 ft.

NORTH LOUISIANA WILDCATS

Catahoula Parish—Failure: C. C. Gilger's and F. R. Jackson's Peck 1, sw nw 51-10n-8e, abnd 5935 ft.

Natchitoches Parish—Failure: J. E. Watt's Fair 1, nw nw se 18-10n-10w, abnd, 3401 ft.

Red River Parish — Failure: Haynes B. Ownby's Sample 1, nw se 3-4n-11w, abnd, 6010 ft.

SOUTH LOUISIANA

Evangeline Parish—Pine Prairie: Humble's Ortego 3, start ne cor sec 2, go s'ly 1011 ft alg el, thence w at ra 330 ft in sec 2-4s-1w, abnd 10,184 ft.

Plaquemines Parish—Bastian Bay: Phillips' LLE-Fee 4, go n 63 deg 41 mins e 2329 ft fr USCGS Mon "Augusta" & n 50 deg 33 mins w 867 ft fr sec se sw 30-20s-29e, abnd 10,080 feet.

St. Martin Parish—Anse la Butte: George H. Echols Voorhies 1, begin nw cor sec 72, go abt 5450 ft s 40 deg 45 mins w & 330 ft at ra s 39 deg 15 mins e in sec 72-9s-5e, abnd 10,519 ft.

St. Martin Parish — West Lake Verrett: Shell's St. Mary Parish School Board 5, s 00 deg 29 mins e 2007 ft alg el sec 16 fr ne cor, thence s 89 deg 32 mins w 1997 ft in sec 16-14s-12e, abnd 160 ft.

St. Mary Parish—Bayou Sale: Humble's Canal Bank & Trust 4, fr most e'ly cor sec 16, go 4600 ft sw alg nwl of sec 17, thence se at ra 76 ft in sec 17-16s-9e, 5½-in 10,482 ft, perf 10,350-360 ft, flow 259 bbls, ⅛-in, 11,099 ft.

MICHIGAN

Bay County—Kawkawlin: Gulf's Blanche 1, s½ se nw 28-15n-4e, Dundee lime, pump 29 bbls, 2947 ft.

Gulf's Goulet 1, s½ ne nw 33-15n-4e, Traverse lime, flow 242 bbls 18 hrs, 2128 ft.

Gulf's Bedell 1, s½ ne ne 33-15n-4e, Dundee lime, pump 26 bbls 15 hrs, 2931 ft.

Gulf's Rechsteiner 1, s½ ne se 3-14n-4e, Dundee lime, pump 28 bbls, 2921 ft.

Isabella County—Broomfield: Davison Obenauer's Fritz 1, sw sw sw 13-14n-6w, Stray sand, 220,000 gas, 1354 ft.

Osceola County—Evart: Sun's Lauman 1, n½ se se 21-18n-8w, Dundee lime, dry 3830 ft.

Roscommon County—Headquarters: Mogul Oil Co.'s State C 1, s½ se ne ne 34-21n-3w, Traverse lime, dry 3462 ft.

Van Buren County—North Bangor: Harris Oil Co.'s Piefer 1, sw nw sw 9-2s-16w, Traverse lime, pump 50 bbls, 1028 ft.

N. R. Dodd's Pifer 2, sw nw nw 10-2s-16w, Traverse lime, dry, 1060 ft.

Van Buren County—Geneva: T. C. Hudson's Neundorff 1, sw nw ne 25-1s-16w, Traverse lime, dry 1098 ft.

MICHIGAN WILDCATS

Grand Traverse County—Failure: P. J. Bolger's Weber 1, n½ se se 11-25n-12w, Dundee 2251 ft, dry, 2379 ft.

Midland County—Failure: Smith Petroleum Corp.'s Morris 1, n½ ne sw 1-14n-1e, Marshall sand, dry, 1360 ft.

Oceana County—Failure: Muskegon Development Co.'s State 1, c nw sw 27-13n-15w, owdd, old td 2616 ft, abnd 2757 ft.

MISSISSIPPI

Madison County—Pickens-Sharpsburg: Carter Oil Co.'s Herring 1, 3-11n-3e, swab 25 bbls hr, ⅝-in, 4838 ft.

MISSISSIPPI WILDCATS

Issaquena County—Failure: Hunt Oil Co.'s Robinson-Skinner 1, nw nw nw 8-13n-8w, abnd 4010 ft.

MONTANA

Glacier County — Cut Bank: Santa Rita's Weaver 1, se ne nw 27-35n-6w, swab 88 bbls, elev 3836 ft, Lower Cut Bank 2919-30 ft, td 2931 ft.

Toole County—Kevin-Sunburst: C. A. Nepstad's Haugen 4, sw nw ne 11-35n-3w, acid 500 gals, pump 250 bbls, Madison saturation 1850-57 ft.

NEW MEXICO

Eddy County: O. H. Randall et al's State 1, c se nw 2-17s-30e, flow 80 bbls, 2-in, shot 180 qts 2943-3045 ft.

Lea County — Maljamar: Fair Foundation Co. and Pope's Johns 2-A, c nw ne 26-17s-32e, flow 600 bbls, 2-in, shot 240 qts 4022-4144 ft, td 4175 ft.

San Juan County: Southern Union Prod. Co.'s McGrath 1, 1920 ft wel and 1808 ft nal 2-29n-12w, elev 5902 ft, 750,000 ft sweet gas 2020-2132 ft.

NEW MEXICO WILDCATS

Lea County—Failure: Van S. Welch et al's State-Ayers 1, c se se 36-20s-32e, elev 3614 ft, anhydrite 1110 ft, salt 1253-2820 ft, Yates 3044 ft, abnd in sul w 3439 ft.

Otero County—Failure: H. L. Hunt Oil Co.'s McMillen & Turner 1, c sw se 5-26s-16e, Yeso 265 ft, abnd granite 2175 ft.

Dona Ana County—Failure: Picacho O&G Synd's Armstrong 1, c nw ne 15-23s-1w, abnd 3186 ft.

NEW MEXICO WILDCAT DEEPENED

Dona Ana County—Failure: Al Parker et al's Simmons 1-X, 1100 ft wel and 2200 nsl 35-22s-5e, abnd 3105 ft.

OKLAHOMA

Caddo County—Cement: Ray Stephens' Pierson 1, c se sw se 35-6n-10w, Medrano 5574 ft, pay 5579-5697 ft, flow 450 bbls, 6 hrs, grav 36, 5753 ft.

Caddo County—Apache: Pure's Starr 1, ne ne sw 34-6n-12w, Bromide Dense 3818 ft, sand 3976 ft, flow 190 bbls, 38/64-in, 4027 ft.

Creek County—Unnamed: Sunray's Jordan 1, c sw ne 29-14n-7e, Verdigris 2907-12 ft, shot 18 qts, 1,700,000 gas, 2914 ft.

Creek County—Glenn: Gulf's Berryhill 35, nw se se 7-17n-12e, Glenn 1428 ft, shot 270 qts, pump 2 bbls 2 hrs, 1586 ft.

Lincoln County—Davenport: Wilcox O&G Co.'s Blaney 1, se nw ne 14-14n-5e, Wx 4612 ft, abnd 4710 ft.

Lincoln County—Unnamed: H. L. Berkey's McKeown 1-A, nw sw sw 27-17n-4e, Cleveland 2960 ft, abnd 3010 ft.

Marshall County—Cumberland: Pure's Little 109-4, se nw nw 20-5s-7e, McL 5547 ft, sand 5953 ft, pump 156 bbls 4 hrs, 1-in, 6046 ft.

Okfuskee County — Bearden: Big Chief's Price 1-A, c sw sw 16-10n-9e, Viola 3880 ft, pb 3950 ft, 1000 gal acid, 17,700,000 gas, 3979 ft.

Osage County—Bird Creek: C. W. Hewitt's (Osage) 5, ne ne sw 22-21n-12e, Miss 1624 ft, abnd 1926 ft.

Osage County—Osage City: Moore's (Osage) 2, c n½ ne se 34-22n-8e, Big lime 1895 ft, 1500 gal acid, pump 10 bbls, 1912 ft.

Pawnee County—Cleveland: Sinclair Prairie's Murphy 15, n½ sw ne 20-21n-8e, Bartles 2306 ft, shot 80 qts 2387-2444 ft, pump 21 bbls, 2444 ft.

Payne County—Unnamed: Wood's Ramsey 1, ne ne se 19-18n-5e, Wx 3970 ft, abnd 3973 ft.

Pottawatomie County—NE Shawnee: Stanolind-Amerada's Orr 1, c sw sw 18-11n-5e, Wx 4910 ft, abnd 4948 ft.

Seminole County—Konawa: Comail's Amnson 2, sw se ne 18-6n-6e, sand 2612 ft, flow 79 bbls, 2630 ft.

Seminole County — NE Wewoka: Jordan's Harrison 1-A, ne ne nw 17-8n-8e, Hunton 3921 ft, flow 60 bbls oil, 15 wtr, 4217 ft.

Seminole County—Seminole City: Sinclair Prairie's Spencer 3, c nw se 13-9n-6e, Hunton 3986 ft, 2500 gal acid, flow 125 bbls, 4015 ft.

Seminole County — Bethel: Mealey-Wolf's Alex 1, ne nw ne 17-9n-8e, Booch 3277 ft, abnd 3331 ft.

Seminole County—Sylvan: Howard Sherman's Heiskill 1, c se sw 2-10n-7e, Cromwell 3554 ft, abnd 3581 ft.

OKLAHOMA WELLS DEEPENED

Carter County—West Hewitt: A. L. Tucker's Shores 2, sw sw sw 17-4s-2w, otd 2224 ft, sand 2020-2200 ft, sand 2224-80 ft, pump 40 bbls, 2296 ft.

Creek County—Cushing: Shaw, Doke & Hughes' Yarhola 2, ne ne ne 25-17n-7e, otd 1026 ft, sand 1492 ft, abnd 1518 ft.

Jackson County—Tipton: Gulf's Shirley 2, se nw ne 6-1s-19w, otd 2605 ft, lime 2580 ft, 2000 gal acid 2768 ft, 1200 bbls salt wtr, 2776 ft.

Seminole County — E. Earlsboro: Sinclair Prairie's Jefferson 4, se nw se 19-9n-6e, otd 4213 ft, Wx 4187 ft, pb to 4277 ft, upmp 5 bbls oil, 300 wtr, td 4322 ft.

OKLAHOMA WILDCATS

Creek County — Failure: L. B. Jackson's Noble 1, c ne nw 3-19n-8e, sand 3122-30 ft, sand 3130-66 ft, dolo 3166-83 ft, sandy lime 3183-3200 ft, sand 3200-16 ft, abnd 3215 ft.

Greer County—Failure: Lloyd Noble's Harron 1, c nw nw 11-4n-24w, Panhandle dolo 2290 ft, lime 2360 ft, Pont 2417 ft, Top Arb 5247 ft, abnd 5305 ft.

Lincoln County—Failure: R. W. Willis' School Land 1, nw nw nw 36-12n-6e, Mayes 4140 ft, Wood 4275 ft, Mise 4299 ft, Hunton 4300 ft, Syl 4415 ft, Viola 4505 ft, Dense 4550 ft, Dolo 4553 ft, 1st Wx 4570 ft, 2nd Wx 4629 ft, pb 4410 ft, pb 4345 ft, 2000 gal acid, abnd 4635 ft.

McIntosh County—Failure: Phillips' Ruby

1, c nw sw 30-10n-6e, Brown lime 1235 ft, Cameron sand 1380 ft, Weber Falls zone 2290 ft, salty Borgen 4622 ft, Turkey Mtn 4705 ft, abn 4972 ft.

Okfuskee County—Failure: British American's Admire 1, sw sw sw 24-12n-9e, Union Vy 3186 ft, Mayes 3475 ft, Wood 3655 ft, Hunton 3671 ft, Syl 3733 ft, Viola 3800 ft, Wx 3852 ft, 2nd Wx 3865 ft, abnd 3906 ft.

Pittsburg County—Failure: Phillips' Bowlby 1, ne nw ne 4-5n-12e, McAlister sand 2765 ft, Cameron sand 2795 ft, Warner sand 2980 ft, Atoka 3500 ft, Wapa 5726 ft, Union Vy 6197 ft, Crm 6229 ft, abnd 6508 ft.

Pottawatomie County—Failure: Deep Rock and Shelby's Baker 1, nw ne se 24-10n-2e, Avant 3250 ft, Dewey 3470 ft, Hogs 3750 ft, Ccb 3930 ft, Osw 4780 ft, Base Pa and top Mayes 5363 ft, Wood 5330 ft, Hunt 5455 ft, Syl 5113 ft, Viola 5610 ft, Dense 5661 ft, Dolo 5685 ft, 1st Wx 5744-50 ft, sand 5766-67 ft, 2nd Wx 5837 ft, abnd 5837 ft.

Seminole County—Failure: Bill Vallines' Harris Foundation 1, sw sw sw 30-7n-6e, Allen sand 1284 ft, abnd 1302 ft.

EAST TEXAS

Cherokee County—Rusk: L. O. McMillan and M. Nathan's Huggins 1, 8500 ft ewl and 660 ft nsl of Levi Jordan sur, elev 376 ft, Austin 4781-5102 ft, Woodbine 5111 ft, abnd 5150 ft.

Limestone County—Mexia: Lytle & Phillips' Sanders 1, 750 ft sw of ne and 330 ft nw of se lines 121-ac lse, P. Varella sur, abnd 990 ft.

Wood County—Hawkins: Humble's Smith 1-C, 467 ft from m/n/n and 2430 ft from m/n/e lines E Wideman sur, Woodbine 4630 ft, flow 243 bbls, ¼-in, perf 4844-60 ft, td 4888 ft.

Wood County—Quitman: Amerada's Blalock 1, 660 ft wel and 538 ft nsl of 44.83-ac lse, E. Goodsir sur, elev 449 ft, Georgetown 5050 ft, Paluxy series 6185 ft, flow 797 bbls, ¼-in, natural, perf 6200-62 and 6330-46 ft, td 6376 ft.

EAST TEXAS WILDCATS

San Augustine County—Failure: Continental's Long Bell 1-A, 5050 ft wel and 1400 ft n of m/n/s lines SP 3, elev 227 ft, abnd 5515 ft.

Hunt County—Failure: Cash Oil Co.'s Gibson 1, 1250 ft nsl and on w line of M. B. Bullion sur, elev 469 ft, Austin chalk 1440-2065 ft, abnd 2785 ft.

Rains County — Failure: American Liberty Oil Co.'s Republic 1, 660 ft out nec 40-acre unit, Henry Howell sur, elev 483 ft, Pecan 2200 ft, Austin 3459 ft, Woodbine 4348 ft, Georgetown 5122 ft, abnd in Paluxy water sand 6334 ft.

NORTH TEXAS

Archer County: Danson Oil Co.'s Carpenter 16, 700 ft snl and 465 ft ewl sec 39, blk 4, Clark-Plumb sur, pump 10 bbls, sand 1065-73 ft.

Archer County—Vogtsberger: Fain & McGaha's Thorman 1, 467 ft out nec lot 78, H&TC 11, flow 240 bbls, 12/64-in, natural, 4670-87 ft, td 4690 ft.

Clay County: Jack C. Barnard et al's Hansard 3, sec 1, F. Longario sur, abnd 1230 ft.

Fortex Oil Corp.-Marger Oil Co.'s Dallas Stock Bank-Texaco 6, 330 ft from sw and 360 ft from se lines lse, sec 35, J. Duncan sur, pump 48 bbls, sand 1115-34 ft.

S. H. Walton and Tanner's Rigsby 2-A, sec 2, Wiley Wyatt subdiv of F. Longario sur, abnd 1182 ft.

Montague County — Illinois Bend: R. C. Lipscomb et al's Harmon 2, 1884 ft wel and 330 ft snl W. C. Winters sur, abnd 3963 ft.

Wilbarger County—Harrold: Chas. H. Kadane et al's Cochrain 1, 1320 ft snl and 358 ft ewl MK&T 2, pump-flow 206 bbls, acid 750 gals 3273-85 ft.

Chas. H. Kadane et al's Cochrain 2, 1450 ft nsl and 330 ft ewl H&TC 47, blk 13, pump 240 bbls, acid 750 gals 3291-3314 ft.

Young County—Burns-Ragland: L. T. Burns et al's Rogers 1, 495 ft ewl and 89 ft snl TE&L 290, Bend 4025 ft, Miss 4854 ft, flow 2564 bbls ¾-in, natural, 4858-81 ft.

Young County — Knox-Mississippi: Mudge Oil Co.'s Harrison 8, 660 ft snl and 2155 ft wel F. Jaime sur, Bend 3772-4162 ft, Miss 4728 ft, flow 1667 bbls, ½-in, acid 1000 gals 4728-65 ft.

Young County: Cosden Pet. Corp.'s Owen 1, 467 ft out nec s½ sec 34, B.R.I.R. subdiv of J. E. Dowdle sur, flow 17 bbls, 23/64-in, acid 3000 gals, perf 3990-4001 ft, td 4045 ft.

Chas. E. Knox et al's Worsham 2, lot 8, TE&L 3412, abnd 4345 ft.

Panhandle Ref. Co.-S. H. Fagadau's Allar-Hunt 10, 3798 ft snl and 2710 ft wel of s-1185-ac, TE&L 3409, flow 590 bbls, ½-in, natural, sand 2718-26 ft.

NORTH TEXAS WILDCATS

Clay County—Failure: J. W. Hastings et al's Turner 1, 330 ft nsl and 990 ft ewl blk 55, Specht-McCutchen sur, abnd 1248 ft.

Jack County—Failure: Trumter Pet. Corp.'s Bloodworth-Wilcox 1, 2560 ft from sw and 1600 ft from se lines Wm. McDonald sur A-380, Gunsight 406-08 ft, abnd 430 ft.

Wichita County—Failures: Akin-Dimock et al's Obenhaus 1, 1650 ft snl and 2000 ft wel w½ of s 600-ac Jas. Cole sur, A-37, abnd 2015 ft.

Gorman & Metzner's Parker 1-A, 990 ft out swc blk 27, Palo Pinto CSL sur, abnd 1352 ft.

C. Reid et al's Davidson 1, 660 ft ewl and 1700 ft snl of J. R. McDowell sur A-194, abnd 700 ft.

Young County—Failure: Bridwell Oil Co.'s Daws 1, 990 ft out nwc TE&L 765, Gunsight 851-55 ft, abnd 1909 ft.

L. A. Long et al's Donnell 1, 1500 ft from w and 6750 ft snl TE&L 1205, Smithwick 3227 ft, Bend 3248 ft, abnd 3685 ft.

WEST TEXAS

Andrews County—Fullerton: T.P. Coal & Oil Co.'s Jackson 2-A, c sw nw PSL 17, blk 32, flow 1956 bbls, 2-in, acid 24,000 gals Clear Fork 6730-7225 ft.

Andrews County—Mascho: Magnolia's University 1-15, c ne se sec 15, blk 10, elev 3219 ft, San Angelo 5650 ft, Clear Fork 5725 ft, abnd 7627 ft.

Andrews County—West Fuhrman: Phillips' University 1-A, c ne nw sec 3, blk 10, pump 129 bbls, acid 4000 gals, 4413-4600 ft.

Cochran County—Slaughter: Continental's Dean 2-91, 708 ft wel and 1485 ft nsl 525-ac lse, leag 91, Lipscomb CSL, flow 1537 bbls cas, acid 12,000 gals, 5005-69 ft.

Devonian et al's Duggan 23-A, 510 ft out sec lab 12, leag 55, Oldham CSL, flow 1347 bbls, 2½-in, acid 12,000 gals, 5012-49 ft.

Devonian et al's Duggan 19-B, 510 ft out nec lab 22, leag 55, Oldham CSL, flow 808 bbls, 2-in, acid 12,000 gals, 5030-72 ft.

Ector County—Foster: Sunray Oil Co.'s Bagley 6, nw ne sw T&P 17, blk 42, T-2-S, flow 530 bbls, 2-in, shot 350 qts 4250-4370 ft, td 4390 ft.

Ector County—North Cowden: Eugene Constantin et al's Smith 1-A, 880 ft snl and 2200 ft wel T&P 7, blk 42, T-1-S, flow 72 bbls, 12/64-in, shot 820 qts, 4280-4550 ft.

Carl B. King and Bay Pet. Corp.'s Holt 1-C, c ne ne PSL 19, blk A, flow 158 bbls, 2-in, shot 400 qts, 4218-60 ft, td 4293 ft.

Gaines County—Wasson: Mabee O&G Co.'s Willard 3-40, 1980 ft snl and 510 ft ewl PSL 40, blk AX, elev 3533 ft, abnd 5045 ft.

Hockley County—Slaughter: Jerry Hawkins et al's Mallet 12-A, 580 ft out nwc lab 23, leag 47, Edwards CSL, flow 834 bbls cas, acid 11,500 gals 4935-80 ft.

Jerry Hawkins et al's Mallet 29-A, 580 ft out sec lab 17, leag 47, Edwards CSL, flow 687 bbls cas, acid 11,500 gals, 4920-65 ft.

Winkler County — Keystone: Peck-Croft-Hall-Likins' Campbell-Gulf 1-C, 440 ft out sec se nw PSL 28, blk B-3, jkd 3075 ft.

WEST TEXAS WELLS DEEPENED

Upton County — McCamey: Continental's Reese 2, sw se sw MK&T 2, blk 3, otd 2386 ft, pump 30 bbls, acid 500 gals 2421-24 ft.

Continental's Reese 4, nw ne sw MK&T 2, otd 2634 ft, pump 139 bbls, 2642-45 ft.

Continental's Reese 5, ne ne sw MK&T 2, otd 2637 ft, pump 123 bbls, acid 1000 gals 2650-68 ft.

Continental's Reese 6, nw se sw MK&T 2, otd 2451 ft, pump 32 bbls, acid 500 gals 2494-2500 ft.

Continental's Reese 10, ne nw se MK&T 2, otd 2635 ft, pump 19 bbls oil, 57 water, 2674-77 ft.

Ward County: T.P. Coal & Oil Co.'s James 24, H&TC 5, blk 34, otd 2511 ft, no re-test, shot 25 qts 2639-49 ft.

WEST TEXAS WILDCATS

Hockley County—Failure: Geo. P. Livermore's Thomas-Humble 1, 660 ft out nwc lab 29, Ellwood suddiv, Donley CSL, leag 10, elev 3348 ft, anhydrite 2120 ft, Yates frosted grains 2850 ft, brown lime 3690 ft, San Andres 4060 ft, abnd 5516 ft.

Menard County—Failure: Al G. Talbot et al's Wilkinson 1, c se se sec 55, J. H. Gibson sur, elev 2178 ft, lime 3056 ft, Ellenburger 3300 ft, abnd 3612 ft.

Sterling County—Failure: Col-Tex Ref. Co.'s Reed 1, c nw sw W&NW 8, blk 30, elev 2641 ft, San Andres 1915 ft, Ellenburger 9335 ft, abnd 9587 ft.

WEST CENTRAL TEXAS

Callahan County — Prichard: Anderson-Prichard's Sealy-Smith 3, 774 ft out nwc GH&H 121, blk 2, elev 1951 ft, abnd 3056 ft.

Jones County—Strand: S. B. Roberts and Fain-McGaha's Strand 1-B, 510 ft nsl and 528 ft wel nw H&TC 5, blk 5, elev 1530 ft, Palo Pinto 3422 ft, abnd 3453 ft.

Shackelford County: C. J. Kleiner and L. Heltzel's Dawson-Conway 2-A, 1050 ft snl and 1029 ft wel E. T. Ry. sec 165, abnd 1661 ft.

Taylor County—Reddin: Butler-Horne Dr. Co.-Geochemical Surveys' Hudson 4, 1380 ft, ewl and 330 ft snl lot 3, J. A. Nabors sur 9, elev 1773 ft, base Saddle Creek 2202 ft, flow 902 bbls, ¾-in, natural, Lower Hope 2399-2409 ft.

WEST CENTRAL TEXAS WILDCATS

Jones County—Failure: Merry Bros. & Perini, Inc.-Alder Oil Co.'s Hattox 1, 990 ft out nec of 137.7-ac tr, J. M. Long sur 3, elev 1656 ft, abnd 3000 ft.

Shackelford County—Failure: R. H. Roark et al's Chism 1, se sw nw B. A. L. 11, abnd 703 ft.

Taylor County—Failure: Butler-Horne Dr. Co.'s Zant 1, 4200 ft nsl and 2900 ft ewl D. T. Bruce sur 135, elev 1698 ft, abnd 2265 ft.

TEXAS PANHANDLE

Gray County: Wilcox O&G Co.'s Worley-Reynolds 39, se nw sw I&GN 61, blk 3, 4,000,000 gas, 126 lbs rp, shot 480 qts 3045-3165 ft, td 3220 ft.

Hutchinson County: J. E. Crosbie's Pitts 55, 1580 ft snl and 4980 ft wel TC 9, blk M-21, pump 124 bbls, shot 430 qts 2758-2848 ft.

J. M. Huber Corp.'s State-River 5, 575 ft n and 1350 ft w of nwc H&TC 78, blk 46, pump 75 bbls, lime 2693-2702 ft, td 2711 ft.

J. M. Huber Corp.'s Weatherly 27-A, 550 ft out sec sw A&B 26, blk Y, flow 95 bbls gas lift, pay 3010-70 ft, td 3073 ft.

TEXAS GULF COAST

Matagorda County—North Markham: Ohio's Carlson 17, 2464 ft fr el & 1263 ft fr wl of 2779-ac tr, IGN 1, 5½-in 8118 ft, perf 7382-84 ft, flow 10,000,000 gas, ⅛-in, perf 7714-22 ft, flow 177 bbls ⅛-in, td 8131 ft, dual completion.

Harris County—Katy: Humble's American Rice Mill 1-C, 1320 ft fr s&wl of sec 98, blk 1, J. M. Bennett sur, 7-in 7317 ft, 6,800,000 gas, ⅜-in, td 7820 ft.

TEXAS GULF COAST EXTENSION

Fort Bend County — Clodine: Stanolind's Cinco Ranch 1, 467 ft fr s&wl of 369-ac tr, J. Brock sur, set 5½-in 7502 ft, perf 7497-98 ft, flow 86 bbls 3/32-in, td 7502 ft.

Waller County—Katy: Stanolind's Pattison 1, 3 mi n Katy field, 660 ft fr n&el sec 96, 640-ac tr, J. M. Bennett sur, 5½-in 7870 ft, perf 6622-25 ft, flow 153 bbls, ⅛-in, td 8000 ft. Perfs at 4 levels deeper showed gas-distillate. Well opens first oil production in field.

TEXAS GULF COAST WILDCATS

Montgomery County — Discovery: LaGloria Corp.'s (Gray & Wolfe) Grogan-Cochran 1, 3 mi se Magnolia, 647 ft fr nw&sel, 157-ac lse, A. Prather sur, 7-in 10,358 ft, 4½-in liner 11,903½ ft, perf 8760-66 ft, flow 243 bbls, 3/16-in, 38-gr, td 11,921 ft, opens Pinehurst field, Wilcox sand.

LOWER TEXAS COAST

Jackson County—Mayo: Lonnie Glasscock's Heard 2, 467 ft fr sel & 1975 ft fr swl of nw 202-ac tr, James Cummings sur, 5½-in 5507 ft, perf 5088-98 ft, jetted 22 bbls, ⅝-in, td 7256 ft.

Salt Dome Oil Corp.'s Ratliff 2-A, 813 ft fr ql & 467 ft fr s&el's 81-ac tr, W. H. Robertson sur, 5½-in 5108 ft, perf 5087-99 ft, flow 100 bbls, 7/64-in, td 5108 ft.

Jackson County — Stewart: Gulfboard Oil Corp.'s Betts 1, 357 ft fr el & 467 ft fr sl of 40-ac, George Sutherland sur, 5½-in 5007 ft, perf 4995½-5005½ ft, 2 bbls through tubing, no pressure, td 5007 ft.

Jackson County—North LaWard: Hewit & Dougherty's Owens 4, 554 ft fr el & 766 ft fr nl of blk 14, Pickering Ranch subdvn, Patrick Scott sur, 5½-in 5265 ft, perf 5202-15 ft, flow 58 bbls, 3/32-in, td 5625 ft.

Jackson County—West Ranch: Magnolia's West Ranch 246-A, 2520 ft sw fr sw'ly cor J. H. Drummond tr, in R. Musquez gr, 5½-in 5765 ft, perf 5757-62 ft, flow 121 bbls, 7/64-in, td 5765 ft.

Jackson County—Ganado: Texas Co.'s Hultquist 1, 660 ft fr s&wl's 167-ac tr, Morris & Cummings sur 8, 5½-in 6563 ft, perf 6450-56 ft, flow 132 bbls, ⅛-in, td 6563 ft.

Jim Wells County—Gallagher: M. M. Miller & Sons' Gallagher 1-B, 756 ft fr nw & 576 ft fr nel of sw 40-ac of nw½ blk 21, Gallagher subdvn, Casa Blanca gr, 5½-in 5180 ft, perf 5135-45 ft, flow 92 bbls, ⅛-in, td 5259 ft.

Jim Wells County—Seeligson: Ramsey Petroleum Co.'s Bramhal 1, 520 ft fr el & 660 ft fr nl of lot 2 on 60-ac lse, Haldeman subdvn, Richard Ross sur, 5½-in 5969 ft, perf 5913-25 ft, flow 153 bbls, 7/64-in, td 5969 ft.

Karnes County—Hobson: Seaboard's Fertsch 1, 500 ft fr e&sl of 100-ac lse, Don Erasmo Seguin gr, 5½-in 5032 ft, perf 4021-24 ft, flow 112 bbls, ⅛-in, td 4032 ft.

Kleberg County—Stratton: Humble's King Ranch-Paso Ancho 30, 1230 ft n of King 31, 6350-ac portion of King Ranch lse, Paso Ancho de Abajo gr, 5½-in 6689 ft, perf 6645-55 ft, flow 131 bbls, ⅛-in, td 6689 ft.

Live Oak County—South White Creek: Joe Stelzig's Hoelscher 2, 330 ft fr n&sl & 990 ft fr wl of tract 3410, blk 72, Dr. C. F. Simmons subdvn, BS&F 15, 5½-in 835 ft, liner 1850 ft, perf 1835-45 ft, pump 33 bbls, td 1850 ft.

Nueces County — Richard King: Southern Minerals' Richard King 3-C, 1459 ft fr el & 467 ft fr nl sec 9, R. M. King subdvn, 5971-ac lse, 5½-in 5591 ft, perf 5578-83 ft, flow 178 bbls, ⅛-in, td 5591 ft.

San Patricio County — Odem: Seaboard's Bomer 6, 500 ft fr n&wl's blk 5-A, Cubage & Miller subdvn, Juan Hart & Sons gr, 5½-in 5595 ft, perf 5325-29 ft, gas, no gauge, td 6808 ft.

Seaboard's Welder 7-B, 900 ft fr wl & 800

ft fr sl 243-ac tr, se¼ sec 6, Cubage & Miller subdvn, Julian de la Garza gr, 5½-in 6252 ft, perf 5432-40 ft, flow 131 bbls, ½-in, td 6817 ft.

Seaboard's Ellis 4, 997 ft fr nl & 983 ft fr wl 160-ac tr, se¼ sec 7, Cubage & Miller subdvn, Julian de la Garza gr, 5½-in 5453 ft, perf 5442-50 ft, flow 100 bbls, ½-in, td 5453 ft.

LOWER TEXAS COAST WILDCAT

Jackson County—Failure: Fred W. Shield's Pickering 1-B, 490-ac lse, Roseborough Ranch subdvn, Valentin Garcia gr, abnd 6280 ft.

SOUTHWEST TEXAS WILDCAT

Starr County—Failure: Sun's Alvarado 1-A, 1980 ft fr n&el's CCSD&RGNG 553, abnd 7081 ft.

WYOMING

Carbon County—Allen Lake: Ohio's Union Pacific-Wister 2, sw sw se 13-22n-79w, abnd 2183 ft.

Carbon County—Sherrard: Sinclair Wyoming's King 1, se ne ne 31-25n-88w, abnd 3170 ft.

Niobrara County—Lance Creek: Continental's Rodeo-1 7, se sw se 27-36n-65w, elev 4397 ft, swab 468 bbls, Leo sand 5338-90 ft.

Park County—Oregon Basin: Texas Co.'s Sonners 6, nw se ne 30-51n-100w, pump 200 bbls, Embar lime 3431 ft.

Yale Petroleum Co.'s Hancock 3, nw nw ne 5-50n-100w, pump 350 bbls, 8⅝-in 3556 ft, perf 3255-3410 ft Embar lime saturation, Embar 3227 ft, Tensleep 3464 ft, pump 350 bbls, td 3557 ft.

United States Wildcat Starts

ARKANSAS

Calhoun County: Placid Oil Co.'s Freeman-Smith 5, nw se 14-16s-13w, sd.

Placid's Freeman-Smith 6, nw nw 14-15s-14w, lcn.

Placid's Freeman-Smith 7, nw ne 2-15s-14w, lcn.

Little River County: King's Stubblefield 1, nw ne ne 10-12s-30w, sd.

Miller County: Magnolia's Olivet A-9, ne ne 4-16s-26w, dr.

Northern Ordnance, Inc.'s Adcock A-1, nw nw 1-19s-28w, dr.

Union County: Cresslenn Oil Co.'s Trimble & Mahoney 1, sw se 15-16s-15w.

CALIFORNIA

Kern County: Honolulu Oil Corp.'s Fitzgerald 1, nw nw ne 26-29-21, Cymric area, lcn.

ILLINOIS

Fayette County: Gulf's M. Capps 1, sw ne se 31-7n-1e, lcn.

Northern Ordnance Inc.'s O'Conner 1-D, nw ne 28-9n-1e, lcn.

Hamilton County: Texas Co.'s Rawls 1, ne ne se 1-4s-5e, lcn.

W. C. McBride's Marsh 1, se sw sw 32-6s-7e, lcn.

Lawrence County: Smith & Nye's Ridgley 1, sw se ne 11-2n-12w, lcn.

St. Clair County: J. Vetsch et al's Longe 1, se se nw 24-2s-6w, dr.

Washington County: Texas Co.'s Herrmann 1, se sw nw 33-2s-4w, lcn.

Wayne County: Gulf's Pierce 1, ne ne sw 26-2n-6e, dr.

White County: Kingwood Oil Co.'s Spence 1, se ne nw 33-6s-8e, lcn.

KANSAS

Decatur County: Helmerich & Payne's Penn 1, nw nw sw 16-2s-29w, lcn.

Dickinson County: Adair-Morton and Phillhan's Eggleston 1, se nw sw 31-16s-1e, dr 375 ft.

Westgate-Greenland's Haines 1-A, se c sw 23-16s-4e, woc.

Ellis County: Cities Service's Reidel 1, ne c sw 15-13s-16w, mi.

Graham County: Nadel & Gussman et al's Pennington 1, ne ne nw 34-6s-21w, lcn.

Pratt County: Zephyr Drlg. Co.'s Larabee 1, sw c se 9-29s-11w, mog.

Reno County: Herndon Drlg. Co.'s Wilkey 1, ne c 34-22s-8w, dk.

Stafford County: Plains Expl. Co. et al's R. McComb 1, c e½ nw 27-24s-11w, rur.

Zephyr Drlg. Co.'s Knop 1, nw c 9-25s-11w, Anhy 450 ft, dr 2200 ft.

NORTH LOUISIANA

Bienville Parish: Placid Oil Co.'s Southern Advance 1, sw ne 16-15n-6w, sp.

Bossier Parish: Beene's Fenet 1, nw se nw 25-21n-14w, dr.

Catahoula Parish: Roy L. Fisher et al's Rhone 1, sw sw 6-6n-7e, mim.

Sinclair Prairie's State 1, nw se 30-9n-7e, lcn.

Concordia Parish: Northern Ordnance's General American 1, se ne 9-7n-7e, dr.

DeSoto Parish: Oakes-Easton et al's Ramsey 1, nw sw 27-13n-16w, dr.

Grand Cane Oil & Gas Co.'s Union 1, sw nw 22-13n-14w, lcn.

Franklin Parish: Sohio Co.'s Splane 1, ne ne 34-12n-8e, lcn.

Red River Parish: Peterson Petroleum Corp.'s Wilkinson 1, se se 11-12n-10w, dr.

Sabine Parish: Seaport Oil Corp. et al's Phares 1, s½ nw sw 4-5n-12w, spud.

Freeland's Harris et al 1, 20-10n-12w, lcn.

Tensas Parish: Carter et al's Rhodes 2, nw 28-9n-10e, dr.

Webster Parish: Temple's Woodard & Walker 1, ne sw 9-17n-8w, dr.

West Carroll Parish: Continental's Causey 1, se sw sw 10-20n-9e, lcn.

MICHIGAN

Allegan County: Columbia Oil & Gas Co.'s Weber 1, se nw se 18-2n-12w, rig.

Livingston County: J. T. Norris' Stowe 1, c sw sw 9-2n-3e, lcn.

Isabella County: Les. T. Barber's Coril 1, s½ se se 30-13n-6w, rig.

Ottawa County: Perry, Gould and Cross' ver Hage 1, se ne se 15-5n-14w, dr.

Van Buren County: T. C. Hudson's Cross 1, sw nw ne 35-1s-16w, rig.

NEW MEXICO

Lea County: C. T. McLaughlin & Co.'s State-Shell 1, c nw ne 7-17s-33e, sp on 4800-ft test.

San Juan County: Continental et al's Bichla-Bi-To 1, ne sw ne 13-30n-21w, lcn.

OKLAHOMA

Lincoln County: Texas' Well 1, c se sw 11-13n-5e, rog.

Big Chief's Calvin 1, c sw sw ne 3-15n-5e, c&p.

Lastecas' Darby 1, se se se 30-16n-5e, drilling deeper from 3616 ft (test revived).

Pawnee County: Watchorn's Harmon 1, c ne nw 29-23n-4e, rur.

Ingling & Parker's Eyler 1, c sw ne 23-23n-5e, drlg 280 ft.

Pottawatomie County: Mid-Continent's Aydelotte 1, se se se 29-10n-3e, c&p.

EAST TEXAS

Franklin County: L. A. Grelling et al's Stanley 1, 698 ft ewl and 624½ ft from m/n/n lines W. B. Jordan sur, rig Paluxy test.

Titus County: W. B. Hinton et al's Wilson 1, 660 ft from m/e/s and 660 ft from m/e/e lines TC 44, 11 mi n Mt. Pleasant, rig for Paluxy test.

Wood County: F. R. Jackson-R. L. Fisher's McCarley 1, c e½ n-40 of 150-ac tr, H. Anderson sur, A-9, dk for Paluxy test.

Murray Sells et al's Morgan 1, 660 ft out sec 82½-ac lse, Harvey Hall sur, rig for Paluxy test.

NORTH TEXAS

Archer County: F. T. Johnson et al's Lyles 1, se se nw SP 2, A-1231, lcn 1700-ft test.

White & Duncan's Hallman Bros. 1, 1400 ft nsl and 330 ft ewl SP 2, A-1214, lcn 1700-ft test.

Clay County: Akin-Dimock et al's Stephenson 1, 330 ft from n and 330 ft from se lines blk 55, Specht-McCutchen sur, lcn 1200-ft test.

Akin-Dimock et al's Henderson 1, 990 ft snl and 2250 ft wel of S. Hernandez sur A-185, lcn 1350-ft test.

W. H. Spradlin get al's Duncan-Texaco 1, 5300 ft from nw and 2350 ft from ne lines blk 15, Bacon subdiv, lcn 1200-ft test.

Sussex Oil Co.'s Groves 1, 990 ft wel and 725 ft snl blk 87, Byers subdiv, lcn 1200-ft test.

Cooke County: Akin & Dimock's Ray 1, 990 ft from m/e/e and m/n/s lines J. J. Coker sur A-1558, lcn 3500-ft test.

Wilbarger County: Staley Oil Co.'s Wheeler 1, 1584 ft snl and 1188 wel H&TC 56, blk 4, lcn 1900-ft test.

Young County: Bridwell Oil Co.'s Daws 1-A, 934 ft ewl and 330 ft snl TE&L 764, lcn 2000-ft test.

WEST TEXAS

Howard County: Ray Oil Co.'s Hutto 1, se se se T&P 46, blk 34, T-1-N, lcn 3000-ft test.

WEST CENTRAL TEXAS

Eastland County: E. M. Thomasson et al's Tate 1, 330 ft snl and 1320 ft wel Stanley Lackerman sur 796, lcn 2500-ft test.

TEXAS GULF COAST

Matagorda County: Stanolind's Pybus 1, 194-ac tr, G. W. Nexson sur, w Blessing field, lcn 9000-ft test.

Jefferson County: Glenn H. McCarthy's Hebert 1, 3½ mi nw Port Acres in W. N. Sigler sur, lcn 9500-ft test.

LOWER TEXAS COAST

Jim Wells County: O. W. Killam's Starke 1, 467 ft fr n&wl of S. F. Stephenson sur 9, lcn 5000-ft test.

San Patricio County: Coastal Refineries and Henshaw Bros.' Botello 1, 660 ft fr n&el of sec 22, Cubage & Miller subdvn, 3½ mi ne Odem field, lcn 6500-ft test.

Victoria County: Rowan & Hope's Ragsdale 1, 6669 ft fr swl & 660 ft fr sel of 3300-ac tr, James McConnaughy sur, lcn 4600-ft test.

SOUTHWEST TEXAS

Duval County: L. A. Douglas' Labbe Est. 1-A, 467 ft fr n&wl of 167-ac tr, IGN sur 2, se Labbe field, dr.

Jim Hogg County: Republic Natural Gas Co.'s Thompson 1, 466 ft fr wl & 880 ft fr sl of 250-ac tr, sec 577, El Peyote gr, lcn.

LaSalle County: Progress Petroleum Co.'s Cuhl 1, 330 ft fr el & 1320 ft fr nl 320-ac tr, D. M. Murphy sur, 15 mi se Los Angeles, lcn 6000-ft test.

Starr County: Baldridge & King's Hinojosa 1, 2640 ft fr n&el of share 1, porcion 109, 800-ac lse, nw Rio Grande City, rigging 2200-ft test.

Dee Davenport and Lockhart Oil Co.'s Garza 2, 660 ft fr swl of share 37-B, porcion 80, J. A. de la Garza Falcon gr, lcn 4200-ft test.

Webb County: Forest Development Co.'s Bruni 1, 1650 ft fr n&el of 520-ac lse, blk 49, Albercas de Arriba gr, dr 2500-ft test.

Squeaks from the Bull Wheel

Sour Puss

"How are you this morning?"

"All right."

"Well, you ought to notify your face."

Looks Won't Matter

"We're having a party tonight, and won't you come along?"

"Oh, I can't. I'd love to but I haven't a thing to wear."

"That's all right; this is a blind date."

Advice

"I'm going on a picnic with a young sailor. What do you think I should take?"

"Care!"

Heard at Camp

An east-side draftee, filling out his Army papers, listed himself as Joe Jones, C.P.A. Being assigned to a camp where the accounts were in something of a mess, he was promptly given an office, a big pile of ledgers that needed attention, and a drill-free month in which to bring the books up to date.

At the end of the month, officers discovered that the books were in the same condition as before. They called the private and asked why he hadn't done his work.

"Please," he replied, "but I know nothing about bookkeeping."

"Then why did you list yourself as a C.P.A.?" barked the C.O.

"Because that's my business," insisted the private, "Cleaning, Pressing and Alterations."

Store Stuff

"I would like to buy a brassiere."

"What bust?"

"Nothing bust. It just wore out."

Explained

"How did you get that bad eye?"

"It's a birth mark."

"What do you mean, a birth mark?"

"I got in the wrong one on the Century last night."

Not What He Expected

"Sugar Pie did that kiss Ah just gave you make you long fo' another?"

"Sho did, Boy, hit sho did. But he's gone to war."

Notes for the Equipment Buyer and User

Cartridge Coupler

E. I. DU PONT DE NEMOURS & COMPANY

Explosives Department of E. I. du Pont de Nemours & Company announces a new device for joining dynamite cartridges used in seismic prospecting. The device is a convolute-wound paper tube with gripping rings located within it. Charges are held together by this device and remain intact during lowering and poling, thus reducting the possibility of loss of a part-charge or complete shot. The gripping rings offer little resistance to the insertion of the cartridge, but withdrawal is prevented by gripping action of the corrugated edge of the ring. In shipment, construction of the coupler allows it to be pulled back over the cartridge so that the entire assembly is only one inch longer than the standard cartridge without coupler.

Diesel Engines

Worthington Pump and Machinery Corporation, Harrison, New Jersey, announces a bulletin, S-500-B36B, describing the Worthington Type CC Diesel Engines. The engine is adaptable for oil-field work, especially for installation where continuous, heavy-duty loads are to be carried. The bulletin is fully illustrated and also carries useful application data.

Welding

Air Reduction Company, 60 East 42nd Street, New York, has prepared for distribution a new color chart for guidance of welders. The chart shows color photographs of five fundamental flame adjustments: Acetylene burning in air, a strongly carburizing flame, slight excess of acetylene flame, neutral flame, and an oxidizing flame.

Wheelco Company Announces Sales Staff Changes

Wheelco Instruments Company, Chicago, announces three additions to the sales and service staff: Hugh Acock, formerly in the Tulsa territory, has been named Texas district manager with headquarters in Houston. C. H. Garrison has been named Kansas City representative, with a territory including western counties of Missouri. Russell George has been added to the sales and service department of the company's combustion safeguard division, with headquarters in Chicago.

Beaumont Iron Works Gets "E" Award

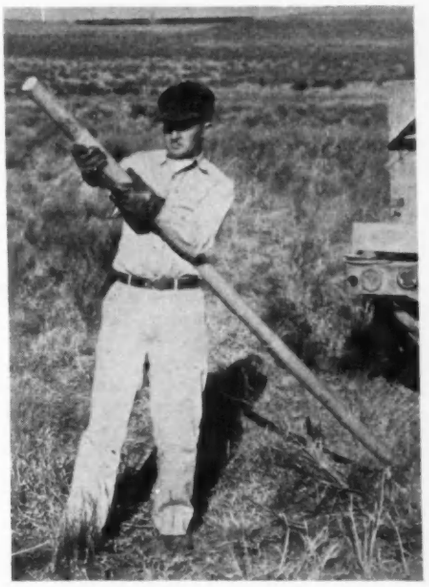
Beaumont Iron Works was awarded the Army-Navy "E" on March 25, at the Beaumont, Texas, plant, for meritorious service in the production of military equipment, and materials.

Presentation of the "E" Pennant was made to President A. I. Brainard by Rear Admiral P. W. Foote, USN, retired, inspector of naval material.

Colonel Royden Williamson, presented "E" pins which were accepted in behalf of the employes by John W. Baer, a welder in the company's plant, whose son was lost in the Solomons battle.

P. B. Doty, president of First National Bank of Beaumont, gave the principal address, tracing the 33 years of growth of Beaumont Iron Works Company from Spindletop days to its present modern steel foundry and manufacturing plant.

Among others attending were J. L. Shakely, president, and Robert McCoy, Jr., vice president of Frick-Reid Supply Corporation.



A member of an oil prospecting crew uses the new Du Pont "Fast-Coupler" to join dynamite cartridges for a charge with which to make a seismic shot.

Electric Rig

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, announces a new booklet describing and illustrating electric drilling rigs.

The new booklet discusses electric drilling, tells where to use d-c variable voltage rigs, and where to use a-c equipment.

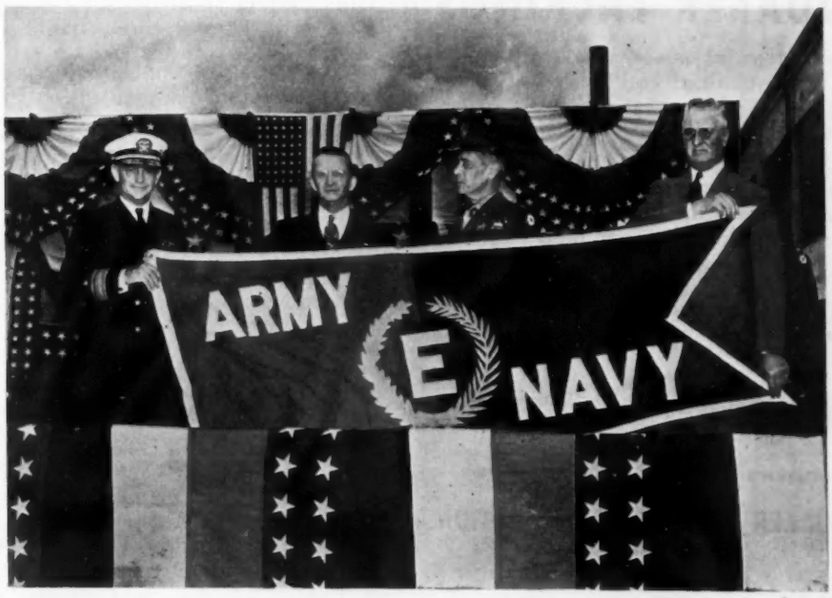
D-c variable voltage rigs are suggested for use where suitable water for boilers is difficult to obtain, where fuel is not abundant, where mobility is required, where arrangement and relative location of apparatus is important, where partial or total output of several internal combustion engines must be available with smooth, positive control, or where full capacity is desirable without engine stalling. A double page diagram shows the plan view layout of complete d-c drilling rig equipment.

A similar diagram illustrates the a-c equipment layout, for use where an a-c transmission line is accessible, where minimum first cost and weight are desirable, where maximum simplicity is important, or where liquid or gas fuel is not easily obtainable.

Typical equipments for various drilling depths are listed for both a-c and d-c drilling, and their maintenance and care are discussed. Also included is a section on auxiliary equipment required on drilling rigs.

V-Belt Drives

Gates Rubber Company, Houston, Texas, illustrates a number of V-belt drive applications in the April issue of "Industrial News." Each installation was designed to cover a specific problem of equipment maintenance or output.



Presentation of "E" Pennant to Beaumont Iron Works Company. Left to right: Rear Admiral P. W. Foote; John W. Baer, veteran employe; Colonel Royden Williamson, and A. I. Brainard, president of the company.

Complete Fuel Utilization

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BTU's consumed do not determine delivered power, steam or heat. As an instance, 1/32 of an inch of scale requires a surplus fuel consumption of 10%; ⅛ of an inch 25%.

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Automatically Frees Boilers and

tubes of scale and corrosion, and keeps them free, in absolute safety to personnel and equipment.

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Guard your power, don't waste it—Quaker can aid you on your Packing problems on equipment for Air, Water, Steam, Oil and Chemicals.

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Men in the Industry's News

CHARLES R. COX has recently been elected president of National Tube Company and of Tubular Alloy Steel Corporation, Pittsburgh. He has been associated with National Tube Company since 1934. At that time he was employed at the Ellwood Works, where he soon became general superintendent. In 1936, he was appointed vice president in charge of operations of National Tube Company, with headquarters in Pittsburgh.

J. N. McGIRL has been appointed district manager at Tulsa of the land and exploration department of Tide Water Associated Oil Company, succeeding R. V. L. Stratton, resigned. Mr. McGirl graduated from the Rolla School of Mines in 1922. Since that time he has had extensive experience as geologist, engineer and operator in Venezuela, South America, and in the Mid-Continent. From 1926 to 1932 he directed activities at Tulsa, for W. C. McBride, Inc., and for Silurian Oil Company. Recently he has been engaged in development of properties in North and West Texas.

O. V. HENRY has been promoted from district production superintendent to general superintendent of the Michigan division of The Ohio Oil Company. He was transferred to Michigan from Haynesville, Louisiana, in 1941. D. Leon Province is being transferred from Hobbs, New Mexico, to succeed Henry.

ALLEN P. COLBY has been appointed advertising manager of all divisions of The National Supply Company, with headquarters in Pittsburgh. R. M. Sylvis was named assistant advertising manager.

LARRY O'DONNELL, Shell Oil Company, has been elected president of The Technical Club (Houston). Other officers named were W. A. Davis, Baker Oil Tools, vice president, and Lynn Meador, Quintana Petroleum Company, secretary-treasurer.

C. P. WILLIAMS has been appointed district manager of industrial rubber products sales for Thermoid Rubber Division of Thermoid Company, with headquarters in Houston.

JAMES H. WITHERS has joined F. J. Hearty & Company, Los Angeles representatives for Edward Valve and Manufacturing Company, with headquarters in Los Angeles.

GEORGE V. COHEE has been granted a leave of absence from the Indiana Geological Survey, and now is with the Petroleum Administration for War in Washington as production analyst in the Economics and Supply Section of the Production Division. P. Hastings Keller is acting assistant state geologist during Cohee's absence.

W. L. MELLON, Gulf Oil Corporation's chairman of the board, is one of three employes receiving a service award emblem for completion of 40 years of service with the organization. Herman Taylor, superintendent of the Fort Worth, Texas, refinery and C. M. Hilliard, manager of the fuel and gas oil department, Jacksonville, Florida, are the others.

Altogether this year 2352 employes are being given service awards for 10 to 40 years of service with Gulf Oil Corporation. The awards are now being presented in the different offices, refineries, laboratories, and production fields of the company in 32 states.

Awards will be given to 38 employes who have completed 35 years of service; 63, 30 years; 365, 25 years; 630, 20 years; 805 15 years; and 448, 10 years. This is the fourth year that the Gulf service award plan has been in effect, and to date 12,813 of the company's 29,829 employes have received such awards.

W. B. BLANK, sales representative for The National Supply Company, has transferred from the McAlester area to Tulsa.

GLEN E. THOMPSON has resigned as tax attorney for Tide Water Associated Oil Company, to enter business as an independent tax consultant at Dallas.

J. L. RICH, professor of geology at the University of Cincinnati, addressed the Tulsa Geological Society, April 5, on "Problems of South American Geology as Suggested by an Aerial Traverse."

PRENTISS SEALE, district manager of Hughes Tool Company for Oklahoma and Kansas, died at Hays, Kansas, April 6. He was 53 years old, and had been with the company since 1925, becoming district manager for Oklahoma and Kansas in 1935. He was a member of India Temple Shrine, in Oklahoma City, and was a member of both York and Scottish Rite bodies. Funeral services were held in Oklahoma City, April 9.

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